Madison County

MONTANA [illegible]
1515 E[illegible]
Ca[illegible]
Helena, MT 59620-1800

Norris/Red Bluff	Boaz	PA # 29-013
	Grubstake	PA # 29-399
Norwegian	Norwegian	PA # 29-006
Pony	Atlantic & Pacific	PA # 29-033
	Boss Tweed	PA # 29-034
	Strawberry	PA # 29-038
Rochester	Emma	PA # 29-061
	Thistle No. 1	PA # 29-073
	Watseca Millsite	PA # 29-075
Sheridan	Smuggler	PA # 29-010
	Goldschmidt-Steiner	PA # 29-078
	Red Pine	PA # 29-079
	Broad Gauge	PA # 29-293
	Latest Out	PA # 29-354
	Uncle Sam	PA # 29-383
	Lakeshore	PA # 29-436
	Buckeye	PA # 29-451
	Pedro	PA # 29-455
	SE SW S26 (Keynote)	PA # 29-474
	NE SE S26	PA # 29-476
Silver Star	Broadway/Victoria	PA # 29-179

MADISON

NORRIS/RED BLUFF

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BOAZ **PA#:** 29-013

Date: September 13, 1993 **Time:** 1500

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: S. Babits, Pioneer

Visitors: Landowner adjacent to site

Weather/Seasonality Observations: Warm (60°F); clear; no breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): Photos taken were misplaced. Video Tape No. 3.

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Potential to reprocess tailings for lead and zinc. Tailings must be bermed away from tributary. Potential to reprocess waste rock; difficult to revegetate due to size and slope.

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I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BOAZ PA#: 29-013

Legal Description: T 3S ;R 1E ;Sec. 19 , NW1/4 SW1/4 ___1/4

County: MADISON Mining District: NORRIS/RED BLUFF

Latitude: N 45° 33' 35" Longitude: W 111° 39' 16"

Primary Drainage Basin and Code: Hot Springs Creek/10020007
Secondary Drainage Basin: Unnamed tributary of Hot Springs Creek

USGS Quadrangle map name(s): Norris

Mine Type/Commodities: Hardrock/Gold, Lead, Zinc, Silver

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Diane and Lucille, c/o Randolph Mack and Don Hansard, 3320 West Hollyhock Drive, Belgrade, MT 59714. (406) 388-6545.

Relationship to other mines/sites in the area/district: The Grubstake site is located one mile to the southeast of this site. There are numerous prospects, adits, and shafts in close proximity.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? There is a grate on shaft.

General site features: Elevation 5200' , Slope 14° ,
Aspect South

Land use: Mining X , Recreational___, Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 5 acres.
Dimensions:

Predominant vegetation types: Mullen, sagebrush, thistle

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). An unnamed tributary of Hot Springs Creek flows south to north through the tailings and joins Hot Springs Creek two miles downstream. Hot Springs Creek flows into the Madison River two miles downstream of the confluence with the unnamed tributary. The site is underlain by gneiss, schist, and quartz monzonite of the Pony Series.

Mining/milling history, ore type/tenor, host rock, gangue: The site was discovered in 1860 and a mill was built in 1939. Between 1902 to 1935 inclusive produced 3,752 oz. Au, 3,641 oz. Ag, 14,425 lbs. Cu, and 30,763 lbs. of Pb from 1,959 tons of ore. Sulfide ore is pyrite and galena with some chalcopyrite and sphalerite in a quartz gangue. The vein system trends northwesterly, dips 60° northerly and is made up of several closely spaced parallel fissures, of which at least two units have been developed by short drifts and stopes.

Mine Operation?

Shafts -	Yes X,	No___,	# 1,	Comment Grate
Adits -	Yes X,	No___,	# 2,	Comment 2 open
Pits -	Yes X,	No___,	# 1,	Comment Small
Placers -	Yes___,	No X,	# ___,	Comment
Other -	Yes___,	No X,	# ___,	Comment

Mill Operation? Yes X, No____. If yes answer the next three questions:

Period(s) of Operation: 1939

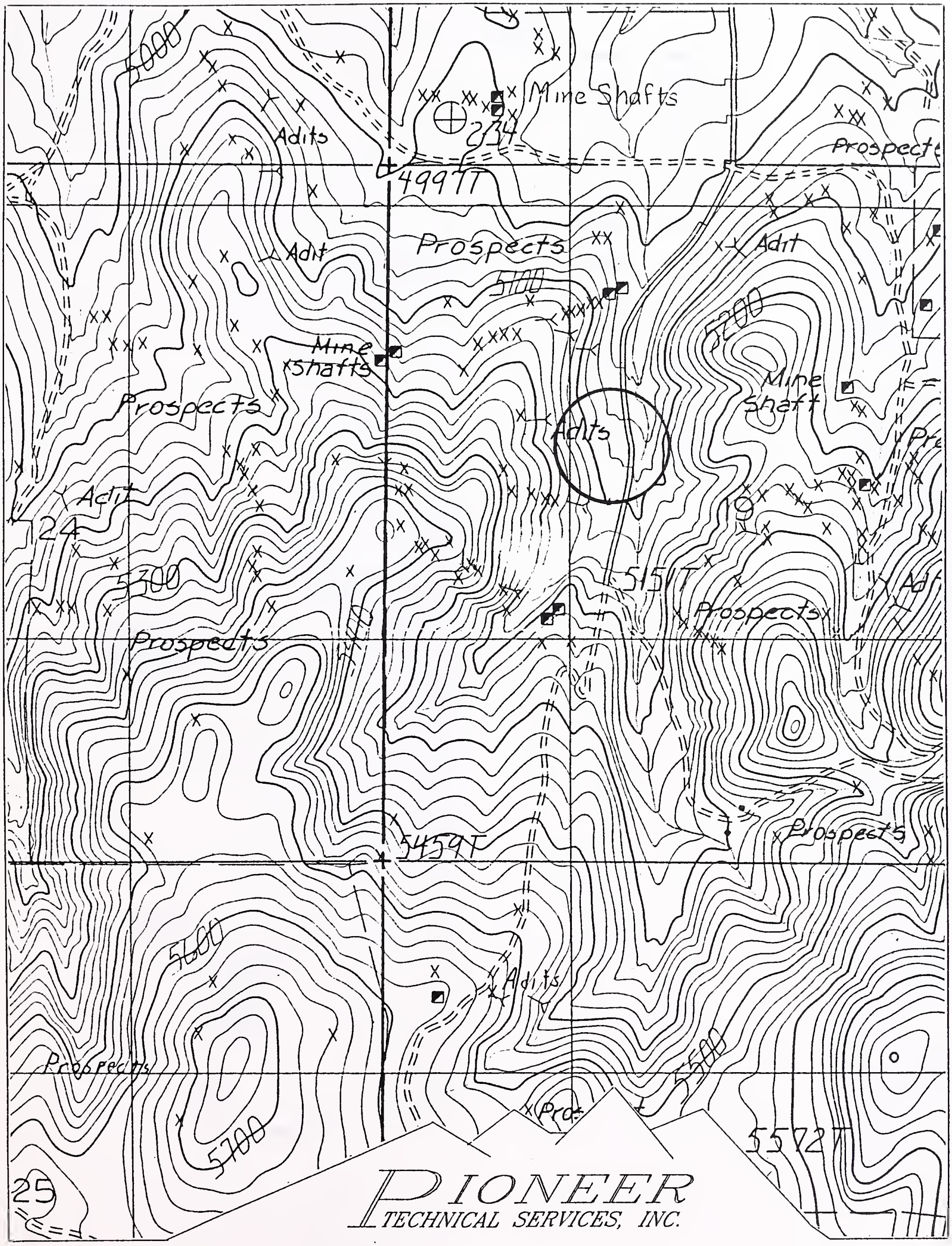
Origin of Ore Milled - Custom Mill X Dedicated Mill___; Number and names of mines that supplied mill feed: Darby claims

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
CN- leach

Montana Bureau of Mines and Geology
Water Well Log Data

11/15/1993

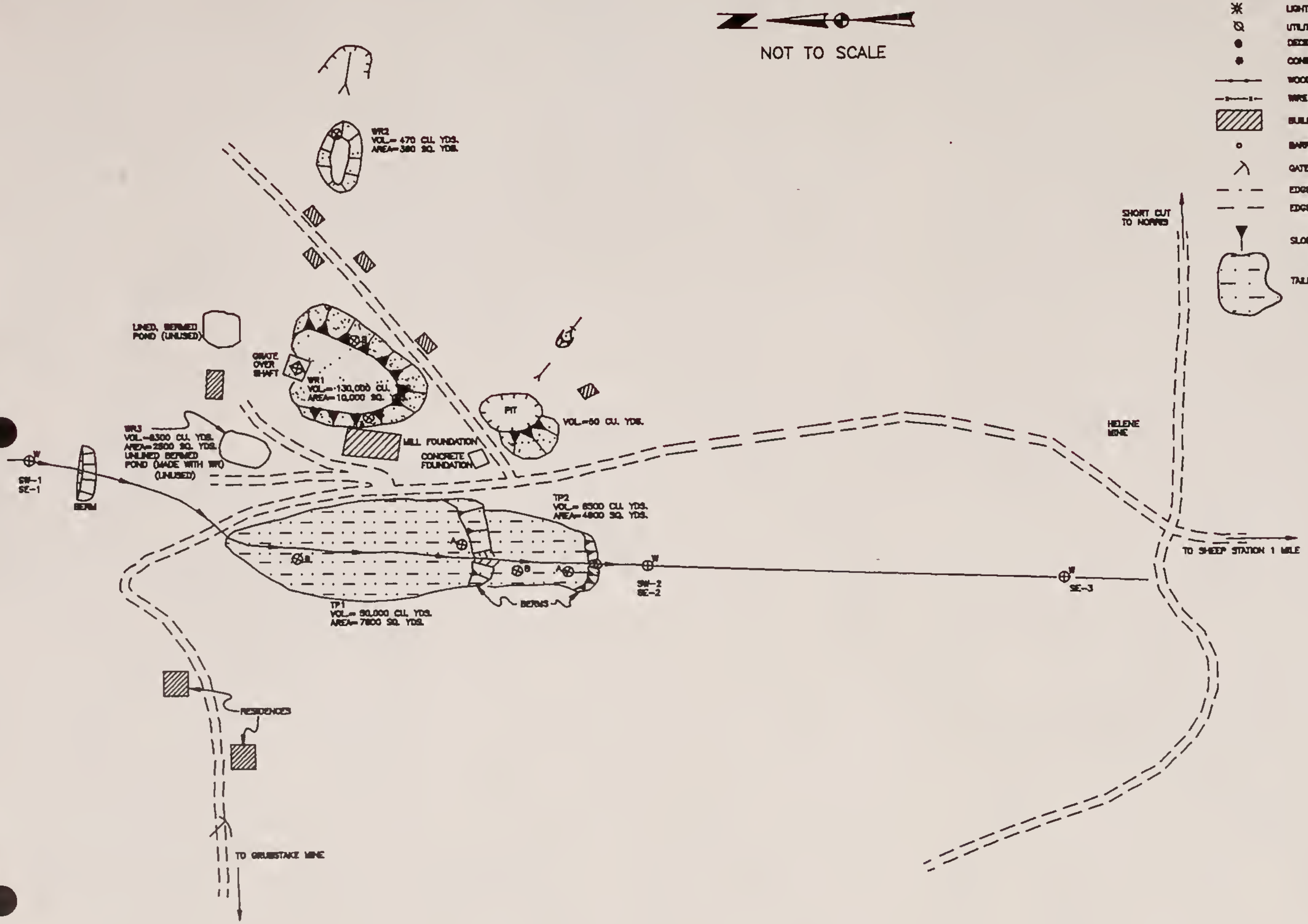
Well No.	Location	Depth	Yield	Static Water Level
M:124024	03S 01E 19 CB	190.0	60.0	150.00
M:124025	03S 01E 19 CB	180.0	0.0	0.00



PIONEER
TECHNICAL SERVICES, INC.

BOAZ, P.A. NO. 29-013

T03S, R01E, SECTION 19
SCALE: 1" = 1000'



LEGEND

EXISTING	DESCRIPTION
	CULVERT
✳	LIGHT (LIGHT POLE)
	UTILITY POLE
●	DECIDUOUS TREE
●	CONIFEROUS TREE
	WOOD FENCE
	WIRE FENCE
▨	BUILDING
○	BARRIER POST
	GATE
	EDGE OF ASPHALT
	EDGE OF GRAVEL
▼	SLOPE DIRECTION
	TAILINGS POND

EXISTING	DESCRIPTION
	OPEN ADIT
	COLLAPSED ADIT
⊠	OPEN SHAFT
	COLLAPSED SHAFT
	EXCAVATION
	WASTE ROCK DUMP
	COLLAPSED TIMBERS
	RAILS
⊕	XRF SAMPLE
⊕	WATER SAMPLE GROUND AND SURFACE
	DRAINAGE
●	WATER WELL
	PONDED WATER
	VEGETATED WET LANDS

DRAWN JTP DATE 15 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
BOAZ PA# 29–013
NORRIS/RED BLUFF DISTRICT MADISON COUNTY

SHEET NO.

29–013.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Fine sand, clay, and silt

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Deepest depth is 30 feet in TP-1 (the shallowest is 10 feet). The deepest depth in TP-2 is 4 feet.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry and moist

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Breached berm

Comments on potential for mitigation: Possibly reprocess for lead.

SOURCE INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	50,000	Berm of northern most pond; profile, 0'-6'	None	6.2 (D)	0.04	29-013-TP-1	09/13/93 2215	T-Metals, ABA, CN-
TP-1A-B	TAIL		Berm of northern most pond; profile, 6'-12'	None	6.0 (D)	0.03			
TP-1A-C	TAIL		Berm of northern most pond; profile, 12'-18'	None	5.6 (D)	0.03			
TP-1A-D	TAIL		Berm of northern most pond; profile, 18'-24'	None	6.0 (D)	0.03			
TP-1A-E	TAIL		Berm of northern most pond; profile, 24'-29'	None	6.7 (D)	0.03			
TP-1A-F	TAIL		Berm of northern most pond; profile, 29'-31' soil	None	6.5 (D)	0.03			
TP-1B-A	TAIL		Northern end of northern most pond; 0'-4', sand/silt	None	6.7 (D)	0.05	29-013-TP-2	09/13/93 2145	T-Metals, ABA, CN-
TP-1B-B	TAIL		Northern end of northern most pond; 4'-6', silty clay	None	4.5 (D)	0.05			
TP-2A	TAIL	6,500	Berm of southern most pond; grab, silty clay	None	3.6 (D)	0.02			
TP-2B	TAIL		Berm of southern most pond; grab, fine sand	None	< 3.5 (D)	0.05			
WR-1A	WR	130,000	West side of WR-1, above mill foundation	None	6.7 (D)	0.04	29-013-WR-1	09/13/93 2145	T-Metals, ABA
WR-1B	WR		East side of WR-1	None	6.8 (D)	0.03			
WR-2	WR	470	East end, west of adit	None	6.8 (D)	0.02			
WR-3	WR	8,300	West side	None	6.2 (D)	0.02			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-013-TP-1 is composite of TP-1A-A through -1A-C, and TP-2A. 29-013-TP-2 is composite of TP-1A-D and -1A-E, TP-1B-A and -1B-B, and TP-2B. 29-013-WR-1 is composite of WR-1A and -1B, WR-2, and WR-3. Background soil sample was taken at the Grubstake site (29-399).

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 29

Distance to nearest well used for drinking? 0.5 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Large, uncontained source with elevated metals levels and close t surface water.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Unnamed tributary of Hot Springs Creek

Dry streambeds: Yes ___, No X, Name(s):

Other surface water: Yes ___, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No ___ Source ID(s): TP-1 and TP-2

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 7 gpm during sampling
High Flow: 50 gpm, Average Flow: 10 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Unnamed tributary flows through TP-1 and TP-2.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetland, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 1,000 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings are in the stream.

SURFACE WATER INVENTORY FORM

SAMPLERS: M. Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	180 feet upgradient from TP-1	7.86	264	178	8.1	129	7 gpm (E)	29-013-SW-1	09/13/93 1715	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	180 feet upgradient from TP-1	N/A	N/A	N/A	N/A	N/A	N/A	29-013-SE-1	09/13/93 1715	T-Metals
SW-2	SW	10 feet downgradient from TP-2	7.88	249	154	11.2	135	7 gpm (E)	29-013-SW-1	09/13/93 1530	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	10 feet downgradient from TP-2	N/A	N/A	N/A	N/A	N/A	N/A	29-013-SE-2	09/13/93 1530	T-Metals
SE-3	SE	750 feet downgradient from TP-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 15 acres (no AMD)

Wetlands present: Yes X , No ___, Describe: Very limited to streamside and marsh area downgradient of TP-2.

Carbonate rocks/soils: Yes X , No ___, Describe: Carbonate precipitate on rocks.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 0.5 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED)/HIGH /MODERATE/LOW/NONE)
TP-1	SO3, pH	Dry to Moist	70,200	70,200	Yes	Moderate/High
TP-2	SO3, pH	Partial	44,100	44,100	Yes	Moderate
WR-1	SO3	Partial	90,000	90,000	Yes	Moderate
WR-2	SO3	Partial	3,240	3,240	Yes	Moderate
WR-3	SO3	Partial	22,500	22,500	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X__, Describe:____________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000____; 1,000-3,000____; 3,000-10,000____; 10,000 or greater____; Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Unrestricted; a warning sign does exist at new area.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________________
Wilderness Area - Yes___, No_X_, Comment________________
T&E Species Habitat - Yes___, No_X_, Comment________________
Bat Habitat - Yes_X_, No___, Comment________________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2__, types and locations: One adit at WR-1 and one at pit

Hazardous structures: Yes___, No_X_, Number____, types and locations:________________

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number____, types and locations: At open adit

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory for the Boaz Mine, Prepared by Daphne Digrindakis, July 10, 1985.

Thurlow, Ernest E., Geology and Ore Deposits of the Lower Hot Springs Mining District, Madison County, Montana, Thesis prepared for Montana School of Mines, Butte, Montana, May 1941.

USBM, Gold Lode Mining in the Tobacco Root Mountains, Madison County, Montana, Information Circular 6972, Written by S.H. Lorain, November 1937, pp. 39-47.

USGS, Mining Districts of the Dillon Quadrangle, Montana, and Adjacent Area, Bulletin No. 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Norris, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

BOAZ
PA NO. 29-013

MDSL AMRB/PIONEER 4/9/93

Boaz PA# 29–013
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 09/13/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29–013–SE–1	6.74 J	119	0.94 U	8.27	35.4	26.6	16400	0.114 J	190	25	6.75	6.5 UJ	50.3	NR
29–013–SE–2	16.7 J	70.9	1.66	5.52	14.8	38.3	10400	0.159 J	337	12.2	596	6.08 UJ	330	NR
29–013–TP–1	95.1 J	230	12.80	9.04	32.4	205	29600	0.536 J	1130	31.1	3030	6.41 UJ	1710	2.21
29–013–TP–2	127 J	303	18.00	11.6	41.1	241	40900	1.26 J	1810	35.2	4800	6.81 J	2440	0.445
29–013–WR–1	25.2 J	253	2.06	12.8	53.8	54.2	27200	0.157 J	1220	44	576	5.44 UJ	399	NR
BACKGROUND	11.4	105	0.4 U	12.8	34.3	31.3	22100	0.11 J	363 J	26.7	6.81 U	5.18 U	43.1	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29–013–TP–1	1.25	39	48.3	9.28	0.24	0.84	0.17	26.2	22.1
29–013–TP–2	0.68	21.2	45.3	24	0.14	0.45	0.09	14.1	31.2
29–013–WR–1	<0.01	0	51.4	51.4	<0.01	<0.01	0.05	0	51.4

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29–013–SW–1	3.69	102	4.59 U	5 U	6.24 U	3.47	1610	0.14 J	71.8	28.3	1.38	31.7 U	35	129
29–013–SW–2	3.9	95.6	4.59 U	5 U	6.24 U	2.33 U	73.1	0.12 U	5.27	10.9 U	15.6	31.7 U	13.8	142

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
29–013–SW–1	190	< 5	11	0.29	< 0.00
29–013–SW–2	196	< 5	11	0.05	< 0.00

LEGEND

SE1 – 180 feet upgradient from tailings pond 1.
SE2 – 10 feet downgradient from tailings pond 2.
TP1 – Composite of subsamples TP1A–A, 1A–B, 1A–C, and TP–2A.
TP2 – Composite of subsamples TP1A–D, 1A–E, 1B–B, and TP–2B.
WR1 – Composite of subsamples WR 1A, 1B, 2, and 3.
BACKGROUND – From the Grubstake (29–399–SS–1).

SW1 – Same as SE1.
SW2 – Same as SE2.

XRF ANALYSIS RESULTS

BOAZ
PA NO. 29-013

Mine Name: Boaz PA# 29-013
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-013-SE-3		23788.5	7836.44	1429.38			22202.7		124.04 *	1271.31		101.247
29-013-TP1A-A		23331.6	15747.7	1287.67	179.44 *	1157.57	28025.8		211.156	1662.98		76.0312
29-013-TP1A-B		17771.5	18424.3	1013.56	209.018 *	1055.11	31644		123.839 *	1444.41		73.1697
29-013-TP1A-C		17886.5	11512.8	1056.81	239.996 *	951.303 *	29504.8		171.547	1120.38		54.0371
29-013-TP1A-D		16480.2	7719.5	783.338	216.683 *	1661.42	42463.5		270.343	1902.83		47.7929
29-013-TP1A-E		18191.2	7632.6	1010.39	156.444 *	1548.26	39438.8		175.602	1422.96		63.5916
29-013-TP1A-F		15908.8	15983	2840.88	235.466 *	765.353 *	32119.2		114.859 *	109.974 *		403.209
29-013-TP1B-A		43508	22532.4	2162.21		2243.04	40456.2		149.301 *	2444.46		77.0812
29-013-TP1B-B		46446.6	28099.7	2235.37		1726.96	40594.8		194.872 *	2489.01		77.8733
29-013-TP2-A		18944.6	13569.4	1002.88	168.54 *	1052.97	26466.6		154.362 *	1397.9		79.3837
29-013-TP2-B		22166.8	11772.9	1217.04	266.974 *	1652.48	29786		191.209	1624.53		55.4651
29-013-TP-1-COMP		20662.6	16684.9	1055.33		1067	30729		158.325 *	1449.31		73.6328
29-013-TP-2-COMP		28976.3	11554.9	1462.35	227.272 *	1666.46	40663.7		167.918 *	2045.08		60.2588
29-013-WR1-A		29543.1	26044.6	2855.67	287.488 *	2797.5	45592.7		185.21	664.207		147.554
29-013-WR1-B		26752.5	27264	3368.46		2663.27	50741		102.561 *	621.472		229.707
29-013-WR-1-COMP	306.445 *	24622.2	22385.9	3259.1	246.5 *	2696.53	46375.2		103.398 *	577.906		214.936
29-013-WR-2		27571.7	9952.04	2634.66	205.076 *	5227.87	71351.1		57.6159 *	1207.99		124.819
29-013-WR-3		10784.3	21905.1	3808.73		714.627 *	42739.2		78.2973 *	143.897		363.574

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-013-SE-3	82.5016			2304.98	112.504			246.442			
29-013-TP1A-A	112.43			2477.26	84.9514			402.71			13.4779 *
29-013-TP1A-B	110.898			2449.53	70.4068			307.699			16.2508 *
29-013-TP1A-C	92.6529			1987.51	84.6129			281.813			
29-013-TP1A-D	64.6966			3496.04	88.997			267.448			
29-013-TP1A-E	56.5718			3976.7	97.1993			404.166			14.1275 *
29-013-TP1A-F	130.284			63.3409	59.5286			460.27			
29-013-TP1B-A	58.0386			3637.22	176.473			475.138			16.6728 *
29-013-TP1B-B	61.3322			4033.6	200.026	320.524 *		630.887			
29-013-TP2-A	80.3739			2380.78	96.2124			356.342			
29-013-TP2-B	52.6623			3097.98	120.664			391.046			15.6086 *
29-013-TP-1-COMP	102.488			2252.33	89.8678			352.866			14.3717 *
29-013-TP-2-COMP	59.2248	35.8385 *		3907.3	123.064			429.176			15.1331 *
29-013-WR1-A	121.608			643.834	120.451			635.883			
29-013-WR1-B	112.427			393.228	127.973			713.904			8.30477 *
29-013-WR-1-COMP	126.195			574.209	97.3593			632.421			
29-013-WR-2	144.917			1963.16	139.101			708.724			
29-013-WR-3	185.425				53.8609			627.838			6.57159 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BOAZ
PA NO. 29-013

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: BOAZ MINE
PA NUMBER: 29-013

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	241.905
6		WELLS - 1 MI. x 2.5		5.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		27
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	37.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	3580194
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		100
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	800
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	266.536
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	19
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	4051347
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		20
26B		DISTANCE TO POPULATION		10
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.575
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		5
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	14175
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		10
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	200
38		LIKELIHOOD SCORE	LINES 36 + 37C	200
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.430
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		5
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	6
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1716
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**76.47**

SITE NAME: BOAZ MINE
PA NUMBER: 29-013

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	175
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		5
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	6
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**21.00**

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: GRUBSTAKE **PA#:** 29-399

Date: July 22, 1993 **Time:** 1530

Field Team Leader: Babits, Pioneer

Sampling Personnel: Pierson, TD&H
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Overcast; breezy (10-15 mph); warm (50°-55°F); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #12: Mill building, headframe, and water tank; #13: Tailings ponds. No video taken.

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Remove or cap tailings. Fill in shaft.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): GRUBSTAKE PA#: 29-399

Legal Description: T 3S ;R 1E ;Sec. 19 , SE1/4 SE1/4 1/4

County: MADISON Mining District: NORRIS/RED BLUFF

Latitude: N 45° 33' 23" Longitude: W 111° 38' 30"

Primary Drainage Basin and Code: Hot Springs Creek/10020007
Secondary Drainage Basin: South Fork Hot Springs

USGS Quadrangle map name(s): Norris

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Florence Ewing and Robert Ewing III, 3049 68th Avenue SE, Mercer Island, WA 98040. (206) 232-3465; Resources America, Inc., P.O. Box 1483, Winter Park, FL 32790.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5500', Slope 20°,
Aspect North

Land use: Mining___, Recreational___, Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 1.3 acres.
Dimensions:

Predominant vegetation types: Yellow clover, grasses, foxtail barley

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by gneiss. Grubstake mine lies on the south side of an unnamed tributary (dry) to Hot Springs Creek. Water in the tributary would flow west and then north for 2.25 miles to confluence with Hot Springs Creek.

Mining/milling history, ore type/tenor, host rock, gangue: Mine operated from 1872 to 1983. Sulfide ore is pyrite, galena, sphalerite, and chalcopyrite in quartz.

Mine Operation?

Shafts - Yes X , No ___, # 1 , Comment Water > 100 feet

Adits - Yes X , No ___, # 2 , Comment 1 with locked door; 1 collapsed

Pits - Yes ___, No X , # ___, Comment

Placers - Yes ___, No X , # ___, Comment

Other - Yes ___, No X , # ___, Comment

Mill Operation? Yes X , No ___. If yes answer the next three questions:

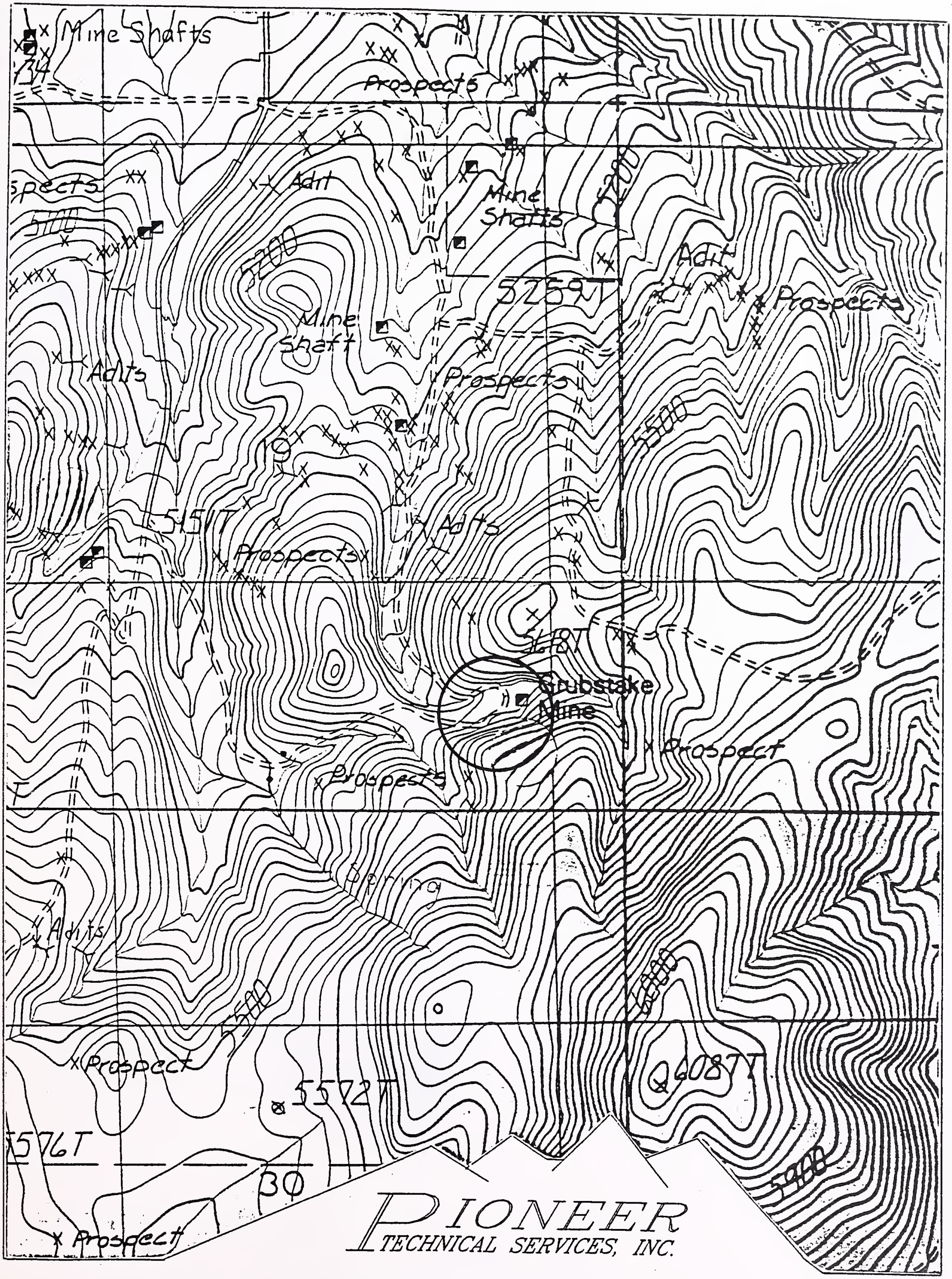
Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
CN- heap leach

Montana Bureau of Mines and Geology 11/05/1993
Water Well Log Data

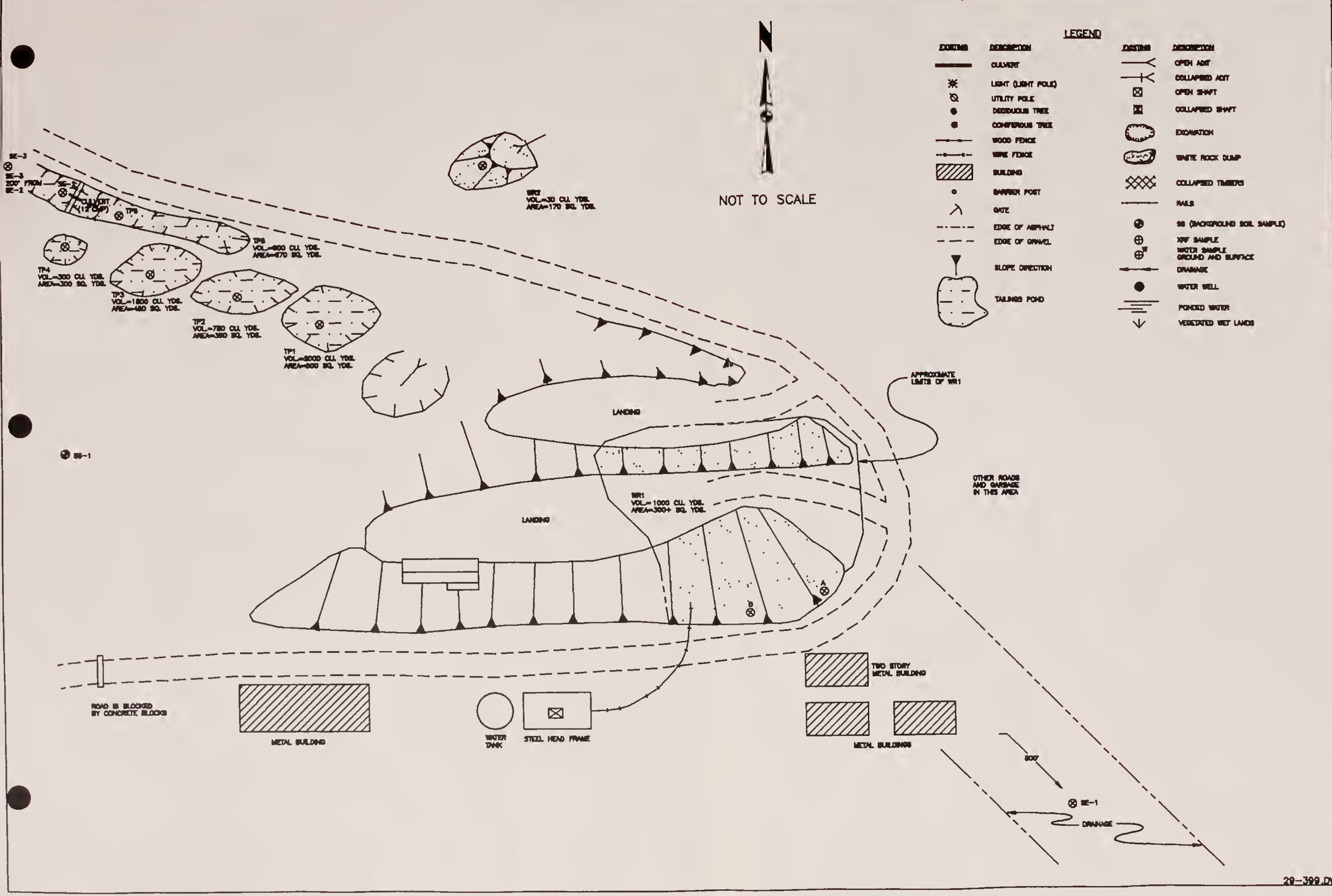
Well No.	Location	Depth	Yield	Static Water Level
M:124024	03S 01E 19 CB	190.0	60.0	150.00
M:124025	03S 01E 19 CB	180.0	0.0	0.00



PIONEER
TECHNICAL SERVICES, INC.

GRUBSTAKE, P.A. NO. 29-399

T03S, R01E, SECTION 19
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

GRUBSTAKE PA# 29-399
NORRIS/RED BLUFF DISTRICT MADISON COUNTY

DRAWN JTP DATE 22 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

29-399.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Sand and clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): TP-5 was the deepest at 5 ft

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Wet

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): TP-3 and -4 are plastic lined (in poor condition); berms are earth and in poor condition.

Comments on potential for mitigation: Fill in trenched areas and revegetate.

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	1,000	West of WR-1B; south face	None	5.4 (D)	0.05	29-399-WR-1	07/22/93 1200	T-Metals, ABA
WR-1B	WR		West of loadout	None	5.8 (D)	0.06			
WR-2	WR	30	Off top center of dump	None	6.6 (D)	0.04			
TP-1A	TAIL	2,000	Pond furthest south, middle; 0-10", gravel and sand	Berm	7.0 (D)	0.03	29-399-TP-1	07/22/93 0945	T-Metals, ABA, CN-
TP-1B	TAIL		Pond furthest south, middle; 10-12", underlying soil	Berm	6.2 (D)	0.06			
TP-2A	TAIL	780	Pond northwest of TP-1, center; 0-6", sand	Berm	6.45 (D)	0.04			
TP-3A	TAIL	1,800	Pond northwest of TP-2, center; 0-12", sand	Plastic liner	6.4 (D)	0.05			
TP-4A	TAIL	900	Pond furthest northwest, center; 0-2.5', silty clay	Plastic liner	6.4 (D)	0.04	29-399-TP-2	07/22/93 0955	T-Metals, ABA, CN-
TP-4B	TAIL		Pond furthest northwest, center; 2.5-3', very fine sand	Plastic liner	6.2 (D)	0.06	29-399-TP-3	07/22/93 1005	T-Metals, ABA, CN-
TP-5A	TAIL	900	Pond north of TP-3 and -4, center; 0-3', silty clay	Berm	6.4 (D)	0.05			
TP-5B	TAIL		Pond north of TP-3 and -4, center; 3-4'	Berm	6.4 (D)	0.06			
SS-1	BKGRND	N/A	Background soil 300' upgradient of TP-1	N/A	6.4 (D)	N/A	29-399-SS-1	07/22/93 1815	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-399-WR-1 is composite of WR-1A and -1B, and WR-2. 29-399-TP-1 is composite of TP-1A and -1B, TP-2A, and TP-3A. 29-399-TP-2 is composite of TP-4A and TP-5A. 29-399-TP-3 is composite of TP-4B and TP-5B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 29

Distance to nearest well used for drinking? 1 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Uncontained sources with some elevated metal values.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X_, Name(s):____

Dry streambeds: Yes_X_, No___, Name(s): Unnamed tributary of Hot Spring Creek

Other surface water: Yes____, No_X_, Name(s)/Description:____

Waste materials within any floodplain: Yes_X_, No___ Source ID(s): Tailings ponds in dry tributary of Hot Springs Creek.

Approximate Flood frequency?___1 yr,_X_10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? Unknown - dry

High Flow:____, Average Flow:____

Distance between waste source(s) and nearest surface water body (ft)? 2.5 miles to Hot Springs Creek.

Surface water draining onto or through waste sources: Yes____, No_X_,

Describe:____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)

Irrigation, fishery, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X_, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): None observed in the dry drainage.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	Background sediment	N/A	N/A	N/A	N/A	N/A	N/A	29-399-SE-3	07/22/93 1835	T-Metals
SE-2	SE	At outfall of culvert below TP-5	N/A	N/A	N/A	N/A	N/A	N/A	29-399-SE-2	07/22/93 1730	T-Metals, CN-
SE-3	SE	Next dam below TP-5	N/A	N/A	N/A	N/A	N/A	N/A	29-399-SE-3	07/22/93 1745	T-Metals, CN-

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Unlimited

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Precipitate present

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	SO3	Moist	2,700	2,700	Yes	Moderate/Low
WR-2	SO3	Moist	1,530	1,530	Yes	Moderate/Low
TP-1	None	Dry	1,530	4,500	Yes	Moderate/High
TP-2	None	Dry	3,510	3,510	Yes	Moderate/High
TP-3	None	Dry	4,050	4,500	Yes	Moderate/High
TP-4	None	Dry	2,700	2,700	Yes	Moderate/High
TP-5	None	Dry	6,030	6,030	Yes	Moderate/High

Notes and Clarifications: ______________________________

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? Unrestricted; warning signs present

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes___, No_X_, Comment__________
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___
Shaft

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:______________

Bibliography

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USGS, Mining Districts of the Dillon Quadrangle, Montana and Adjacent Areas, Bulletin 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Norris, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

GRUBSTAKE
PA NO. 29-399

MDSL AMRB/PIONEER 4/9/93

Grubstake PA# 29-399
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 07/22/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-399-SE-1	28.3	275	2.1	24.5	81.1	58.8	29200	0.246 J	711 J	78.3	81.1	5.51 U	133	NR
29-399-SE-2	14	125	1.6	12.4	28.4	36.5	16600	0.064 J	439 J	26.3	81	6 U	109	0.387
29-399-SE-3	20.6	226	1.6	19.2	48.4	54	27800	0.145 J	563 J	45.6	156	5.46 U	213	0.295 U
29-399-TP-1	52	117	4.3	11	34.9	54.3	21800	0.122 J	727 J	33	566	5.65 U	588	10.6
29-399-TP-2	63.4	267	9.9	18.3	51.2	148	36600	0.331 J	1360 J	55.3	1690	5.7 U	1340	40.3
29-399-TP-3	54.9	247	9.4	15.2	42.9	101	30600	0.199 J	994 J	38.8	1450	6.99 U	1220	22.3
29-399-WR-1	65	161	3.9	21.7	61.3	72.6	32500	0.289 J	901 J	65.3	417	5.33 U	546	NR
BACKGROUND	11.4	105	0.4 U	12.8	34.3	31.3	22100	0.11 J	363 J	26.7	6.81 U	5.18 U	43.1	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT t/1000t
29-399-TP-1	0.48	15	34.7	19.7	0.1	0.19	0.19	5.94	28.8
29-399-TP-2	0.53	16.6	53.8	37.2	<0.01	0.9	0.12	28.1	25.6
29-399-TP-3	0.57	17.8	41.3	23.5	0.19	0.23	0.15	7.19	34.2
29-399-WR-1	0.29	9.06	48.9	39.8	<0.01	0.15	0.15	4.69	44.2

LEGEND

SE1 - Background sediment.
SE2 - At outfall of culvert below tailings pond 5.
SE3 - Next dam below tailings pond 5.
TP1 - Composite of subsamples TP1A, 1B, 2A, and 3A.
TP2 - Composite of subsamples TP4A and 5A.
TP3 - Composite of subsamples TP4B and 5B.
WR1 - Composite of subsamples WR1A, 1B, and 2.
BACKGROUND - From the Grubstake (29-399-SS-1).

XRF ANALYSIS RESULTS

GRUBSTAKE
PA NO. 29-399

MDSL AMRB/PIONEER 4/9/93

Mine Name: Grubstake PA# 29-399
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-399-SS-1			10940.8	3130.99		895.279 *	40207.2			99.5292 *		258.737
29-399-TP1A-A		17783.5	14150.4	1347.04	211.296 *	420.971 *	17936.1			87.7038 *		245.517
29-399-TP1A-B		26676.6	17539	2563.24	265.242 *	2000.42	43887.2			828.576	70.7379 *	148.007
29-399-TP2-A			14632.4	1434.55		490.072 *	19062.7			117.779 *		269.989
29-399-TP3-A			20904.3	2203.96	163.879 *	983.43 *	33488.8			734.145		175.322
29-399-TP4-A			21714.5	2306.56		1314.83	32782.8		58.1452 *	996.198		153.449
29-399-TP4-B			16349	1322.49	180.742 *	1264.65	25398.5		57.9082 *	1250.76		114.764
29-399-TP5-A			18765	2277.77	151.155 *	1237.92	35676.8			812.394		155.66
29-399-TP5-B			21192.4	3393.76	166.692 *	1195.44 *	50190			703.755		202.689
29-399-TP-1-COMP			19664.8	2070.21		712.56 *	27619.4		117.838 *	421.416	85.9763 *	244.124
29-399-TP-2-COMP			22157.9	2936.85		1457.04	37553.9		108.591 *	1069.61		146.757
29-399-TP-3-COMP			17220	2296.16		949.263 *	34317.7		61.2554 *	1017.47		168.108
29-399-WR1-A			29596.4	2844.44	200.776 *	1522.07	42674.3		61.5617 *	450.048	75.02 *	181.108
29-399-WR1-B	467.277 *		21069	2677.87	335.472 *	1134.82 *	48669.2		71.4979 *	389.865	60.2201 *	139.403
29-399-WR-1-COMP			23852.2	3132.48		1544.08	44791.6			411.381	101.77 *	212.389
29-399-WR-2			8867.96	1937.55	173.417 *	1288.8	29469.6			347.236		326.45
29-399-WR-2-DUP			8897.43	2139.57	198.288 *	1294.75	29169.9			308.088		324.824

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-399-SS-1	127.898				71.1657			409.167			8.31251 *
29-399-TP1A-A	197.091				103.162			690.93			8.16361 *
29-399-TP1A-B	169.713			435.645	142.569			489.596			8.98904 *
29-399-TP2-A	146.529			109.085	99.3727			662.247			11.7656 *
29-399-TP3-A	118.355			807.322	94.8552			516.824	72.1898 *		
29-399-TP4-A	111.1			1190.45	114.498			431.827			
29-399-TP4-B	108.728			1908.8	102.643			420.262			
29-399-TP5-A	95.4108			1083.88	99.7332			417.108	78.3471 *		
29-399-TP5-B	145.158			459.39	108.611			485.966			
29-399-TP-1-COMP	134.545			345.943	85.6592			631.387	85.0185 *		13.9339 *
29-399-TP-2-COMP	108.523			1250.41	89.1105			465.925	117.191 *		13.8288 *
29-399-TP-3-COMP	130.887	42.4085 *		1139.93	77.1651			481.755	91.1961 *		
29-399-WR1-A	118.828			216.52	105.836			502.602			9.19632 *
29-399-WR1-B	101.983			193.716	111.157			357.961			
29-399-WR-1-COMP	157.091			343.674	92.6497			571.972			8.32882 *
29-399-WR-2	134.183			393.806	89.7258			584.585	70.4889 *		
29-399-WR-2-DUP	133.869			380.707	90.0116			600.669			

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

GRUBSTAKE
PA NO. 29-399

AIMSS SCORESHEET

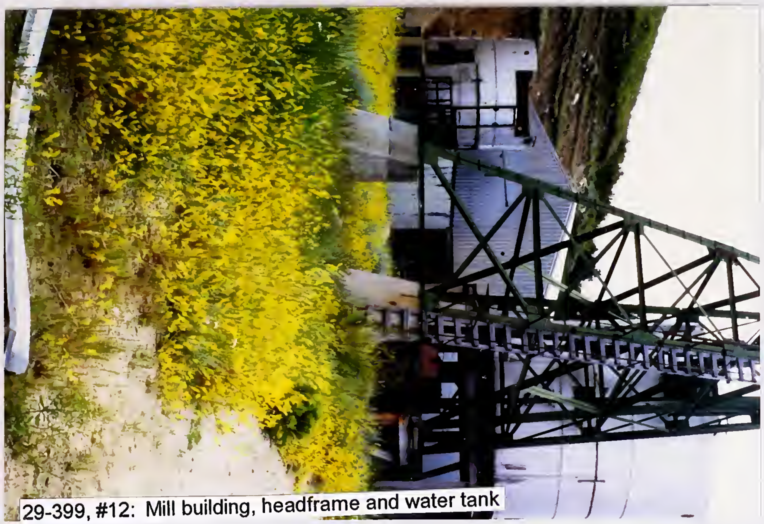
SITE NAME: GRUBSTAKE
PA NUMBER: 29-399

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.362
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		27
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	32.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	21517
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.695
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	2660
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		20
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.093
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	186
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.084
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	10
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	84
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.24**

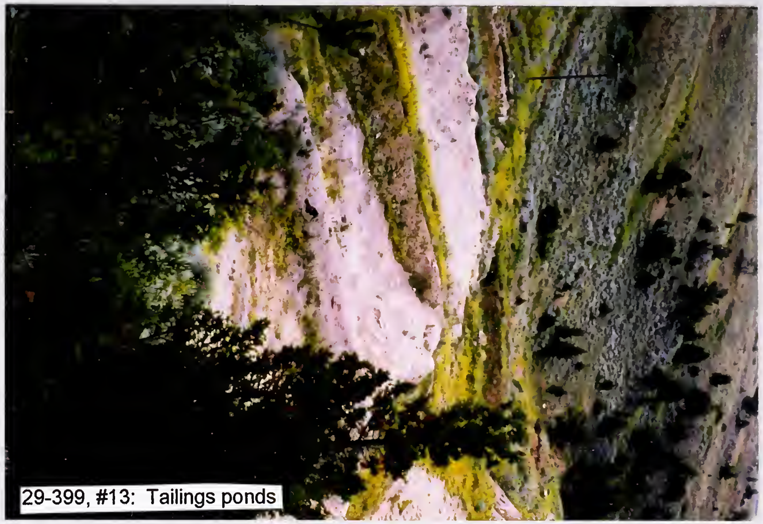
SITE NAME: GRUBSTAKE
PA NUMBER: 29-399

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	100
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	10
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**20.00**



29-399, #12: Mill building, headframe and water tank



29-399, #13: Tailings ponds

NORWEGIAN

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: NORWEGIAN **PA#:** 29-006

Date: September 13, 1993 **Time:** 0900

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: S. Babits, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool to warm (35° to 50°F); no breeze; snow previous night before investigation (0.25" at the site); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): Photos taken were misplaced. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): The Norwegian Mine, as described in literature and as shown on the topographic map, is in Sec. 1 of T3S, R2W. This inventory was performed on the site described by Northern Engineering and Testing in 1988 as the Norwegian, but is in Sec. 2 of T3S, R2W.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: The tailings are a small volume with low metals concentrations; cap and/or revegetate. The waste rock is a small volume and could be easily recontoured and revegetated. No acid mine drainage to consider.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): NORWEGIAN PA#: 29-006

Legal Description: T 3S ;R 2W ;Sec. 2 , NW1/4SE 1/4___1/4

County: MADISON Mining District: NORWEGIAN

Latitude: N 45° 36' 20" Longitude: W 111° 48' 50"

Primary Drainage Basin and Code: Norwegian Creek/10020005
Secondary Drainage Basin: Preacher Creek

USGS Quadrangle map name(s): Maltbys Mound

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Thomas Ryan and Jane Schumuler, E 735 23rd Avenue, Spokane, WA 99203. (509) 747-3271.

Relationship to other mines/sites in the area/district: Numerous mines and prospects in the district. Located on the same deposit as the Sunshine Mine.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 5500', Slope 12°,
Aspect North and east

Land use: Mining___, Recreational___, Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 0.3 acres.
Dimensions:

Predominant vegetation types: Knapweed, sage, grasses

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site is underlain by gneisses and schists, and quart monzonite. Preacher Creek flows southwest to northeast to the northwest of the site. An unnamed tributary of Norwegian Creek flows south to north to the east of the site.

Mining/milling history, ore type/tenor, host rock, gangue: History is unknown; however, the mill appears to be from the 1960's. Ore occurs in quartz veins in pyritic quartz monzonite near contact with gneiss. Veins contain silver and gold in quartz with chalcopyrite, malachite, and chrysocolla.

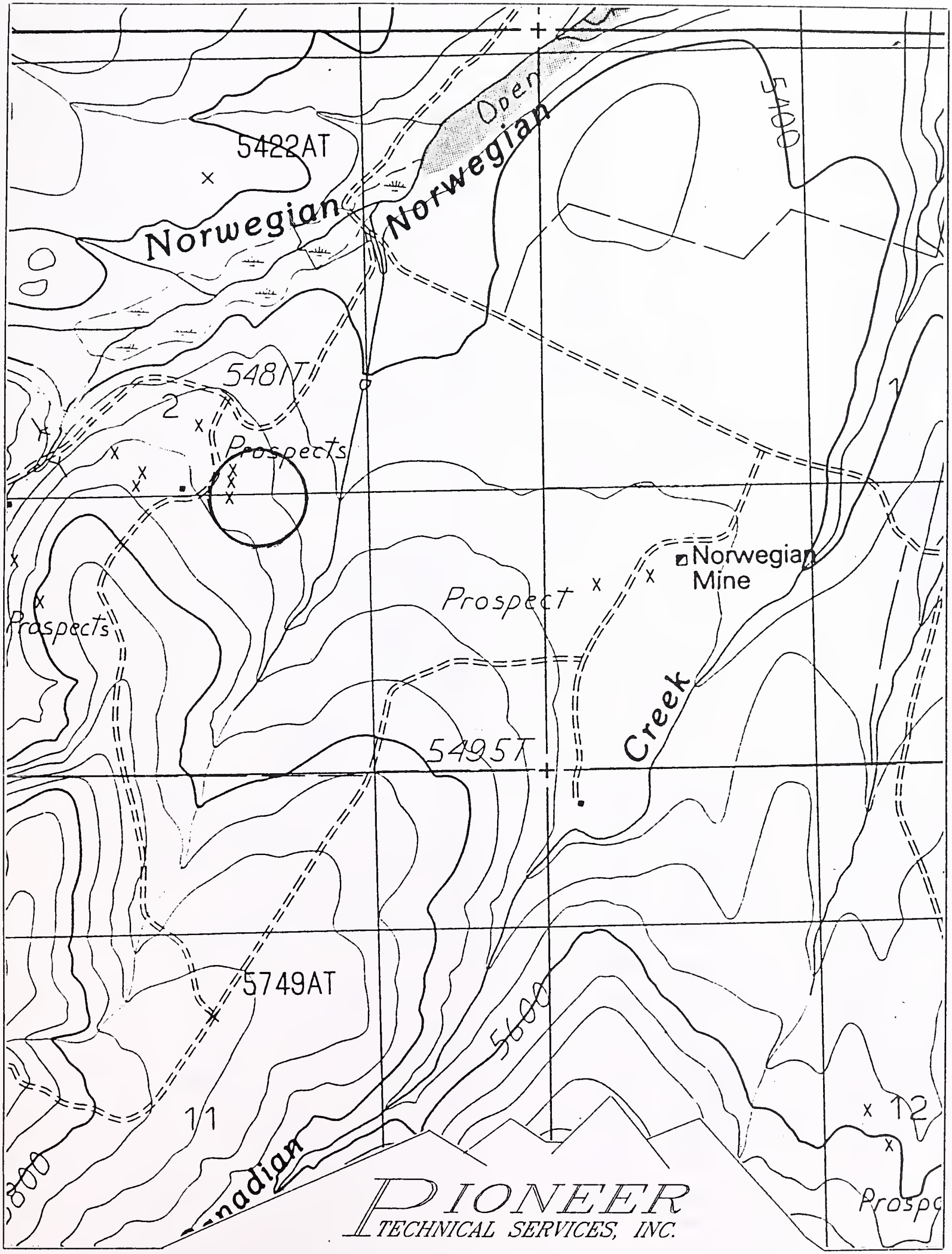
Mine Operation?
Shafts - Yes X, No ___, # 2, Comment Partially collapsed
Adits - Yes ___, No X, # ___, Comment
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes X, No ___. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: Unknown

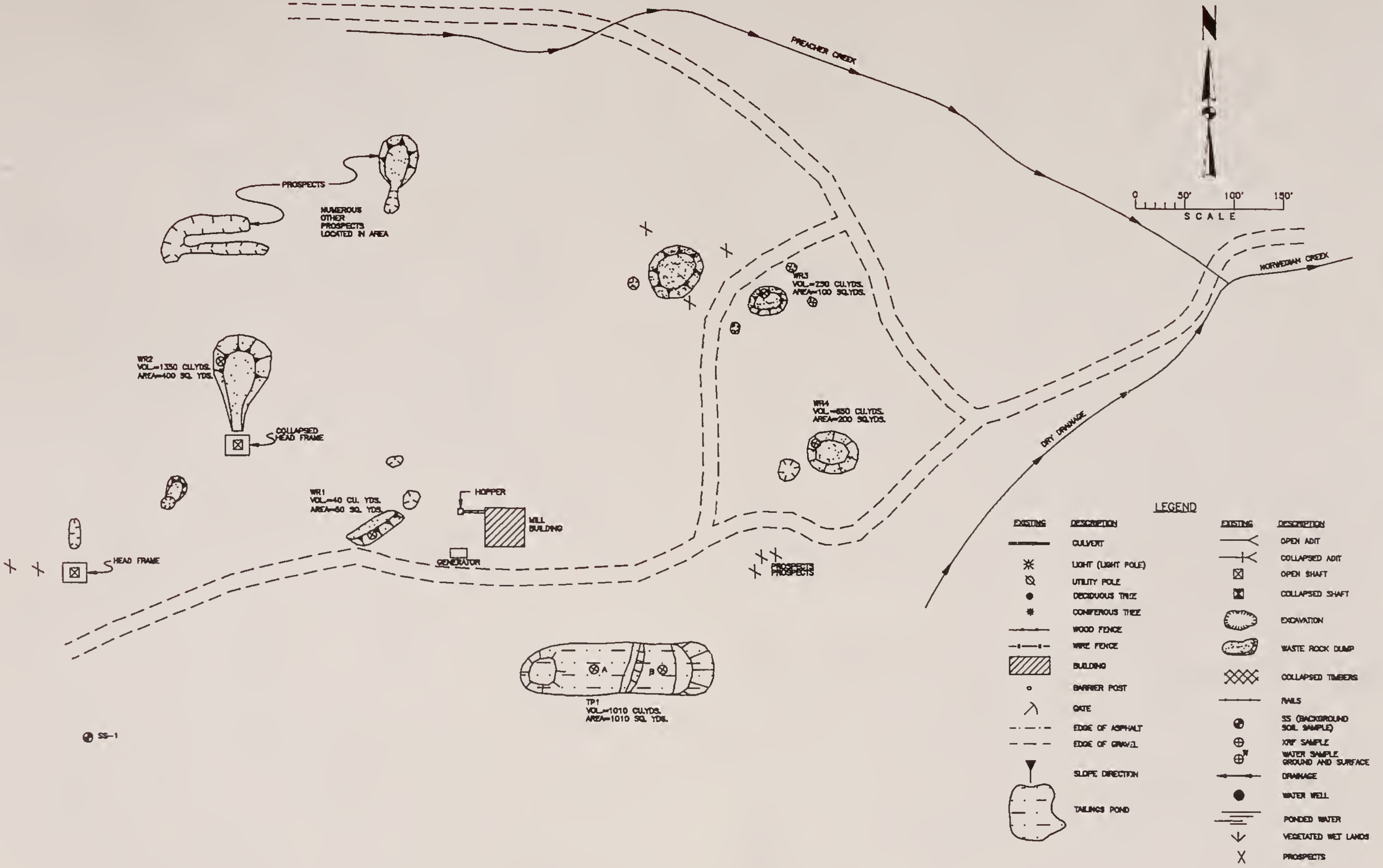
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Unknown



PIONEER
TECHNICAL SERVICES, INC.

NORWEGIAN, P.A. NO. 29-006

T03S, R02W, SECTION 02
SCALE: 1" = 1000'



DRAWN JTP DATE 18 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TDH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

NORWEGIAN PA# 29-006
NORWEGIAN DISTRICT MADISON COUNTY

SHEET NO.

29-006.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Sand to clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Approx. 3 feet

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Moist

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): The berm is intact.

Comments on potential for mitigation: Recontour and revegetate

SOURCE INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	1,010	Middle of pond; profile, 0-20", tan clay	None	5.6 (D)	0.04	29-006-TP-1	09/13/93 1510	T-Metals, ABA, CN-
TP-1A-B	TAIL		Middle of pond; profile, 20-30", tan sand	None	5.6 (D)	0.03			
TP-1A-C	TAIL		Middle of pond; profile, 30-32", soil	None	5.8 (D)	0.04			
TP-1B-A	TAIL		Middle of pond; profile, 0-20", sandy loam	None	6.8 (D)	0.03			
TP-1B-B	TAIL		Middle of pond; profile, 20-30", sandy loam	None	6.0 (D)	0.03			
TP-1B-C	TAIL		Middle of pond; profile, 30-36", underlying soil	None	6.8 (D)	0.03			
WR-1	WR	40	South side	None	6.7 (D)	0.05	29-006-WR-1	09/13/93 1525	T-Metals, ABA
WR-2	WR	1,350	West side	None	6.6 (D)	0.04			
WR-3	WR	250	North side	None	6.7 (D)	0.03			
WR-4	WR	650	North side	None	6.8 (D)	0.03			
SS-1	BKGRND	N/A	Background soil southwest of WR-1	N/A	6.6 (D)	0.03	29-006-SS-1	09/13/93 1315	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-006-TP-1 is composite of TP-1A-A through -1A-C, and TP-1B-A through -1B-C. 29-006-WR-1 is composite of WR-1 through WR-4.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes___, No X , Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 98

Distance to nearest well used for drinking? 1 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Small source with vegetation and deep groundwater.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes____, No X , Name(s):

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes____, No X Source ID(s):

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
1,200 feet between WR-1 and unnamed tributary and 1,200 feet between WR-2 and Preacher Creek.

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes_____,
No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 10 acres (no AMD)

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
TP-1	None	Moist	9,090	4,545	Yes	Low
WR-1	SO3	Partial	450	405	Yes	Low
WR-2	SO3	Partial	3,600	3,240	Yes	Low
WR-3	SO3	Partial	900	810	Yes	Low
WR-4	SO3	Partial	1,800	1,620	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____________________

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads?_Unrestricted___

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes___, No_X_, Comment__________
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_Not Rated
Wetlands Frontage - High___, Medium___, Low_Not Rated
Fisheries Habitat and Species Classification - _Not Rated
Sport Fishery Classification - _Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2__, types and locations:___ Shafts at WR-2 and southwest of WR-2

Hazardous structures: Yes_X_, No___, Number_1__, types and locations:_ Mill building

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____________________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____________________

Fire and/or Explosion hazards: Yes_X_, No___, Explain:_ Plywood mill building

Bibliography

MBMG, Mineral and Industry File 90.0, Red Chief Mine File, Norwegian Mine, Madison County, Montana.

MBMG, Norwegian Placer, Madison County, Form 39, 1983-1987.

MBMG, Well Log Database, September 8, 1993.

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MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Norwegian Mine, Prepared by Northern Engineering and Testing, August 19, 1988.

USBM, Gold Lode Mining in the Tobacco Root Mountains, Madison County, Montana, Information Circular 6972, Written by S.H. Lorain, November 1937.

USGS, Mining Districts of the Dillon Quadrangle, Montana and Adjacent Areas, Bulletin No. 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Maltbys Mound, Montana, 7 1/2 minute Quadrangle, 1987.

LABORATORY ANALYTICAL DATA

NORWEGIAN
PA NO. 29-006

Norwegian PA# 29-006
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 09/13/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-006-TP-1	8.67 J	102	0.94 U	10.4	11.3	382	29100	0.138 J	788	11.5	122	6.48 UJ	100	0.867
29-006-WR-1	6.65 J	139	0.83 U	15.7	17.9	226	24600	0.236 J	817	18.7	172	5.74 UJ	42	NR
BACKGROUND	10.6 J	102	0.94 U	4.2	8.69	23.9	18500	0.105 J	395	4.04	14.7	6.46 UJ	46.7	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-006-TP-1	0.03	0.94	6.48	5.54	0.02	<0.01	0.01	0	6.48
29-006-WR-1	0.06	1.87	10.8	8.88	0.01	0.01	0.04	0.31	10.4

LEGEND

TP1 - Composite of subsamples TP1B-A, 1A-A, 1A-B, 1A-C, 1B-B, and 1B-C.
WR1 - Composite of subsamples WR 1, 2, 3, and 4.
BACKGROUND - From Norwegian Mine (29-006-SS-1)

XRF ANALYSIS RESULTS

NORWEGIAN
PA NO. 29-006

MDSL AMRB/PIONEER 4/9/93

Mine Name: Norwegian PA# 29-006
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-006-SS-1		11563.3	13547.2	1643.26	215.861 *	1011.86	27406.6			124.518	43.3209 *	752.967
29-006-SS-1-DUP		11707	13862.4	1565.08	247.954 *	1104.61	27590			107.452 *	35.8345 *	757.342
29-006-TP1A-A		42532.4	3288	2087		522.248 *	19819.9		147.367 *	285.35		34.4501
29-006-TP1A-B		15394.5	5498.61	431.248 *	231.274 *		17913.1		196.074	92.7835 *		355.224
29-006-TP1A-C		13988.7	7687.89	736.435	239.759 *	442.263 *	24589.6		332.527	110.837 *		599.458
29-006-TP1B-A		16010.7	6695.93	968.679		313.704 *	18279.8		267.793	91.7375 *		361.757
29-006-TP1B-B		26260.1	10143.9	1399.77		689.828 *	26717.9		362.696	65.0663 *		597.361
29-006-TP1B-C		9655.12	19402.3	2774.82		1386.39	43228.3		139.969 *	118.779 *	27.9697 *	918.548
29-006-TP-1-COMP		21301.1	11458.9	1492.97		727.103 *	28912.3		288.39	100.757 *		506.775
29-006-WR-1		25883.2	12968.5	1674.52		1417.28	40057.2		295.201	101.351 *		796.311
29-006-WR-1-COMP		15542.9	19173.8	3114.02		1508.66	51172.4		335.525	125.305 *		783.392
29-006-WR-2		17763	10502.7	1207.81		1522.54	45737.5		328.652	93.9358 *	32.2608 *	866.316
29-006-WR-3		27550.5	7923.53	1207.94	308.125 *	642.175 *	32982.9		829.235	85.897 *		672.894
29-006-WR-4		13054.6	37039.5	5258.05		2683.65	77517.8		154.095 *	162.107	54.7565 *	860.284

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-006-SS-1	139.797				64.6754			798.633			8.89824 *
29-006-SS-1-DUP	137.794				52.1392			799.778			9.72525 *
29-006-TP1A-A	366.484			310.321	221.47			416.401		38.5807 *	32.8901
29-006-TP1A-B	61.2713			36.5245 *	80.5219			368.841			6.22079 *
29-006-TP1A-C	111.009			54.2752 *	65.7408			697.319	80.372 *		8.19742 *
29-006-TP1B-A	149.462			67.829	84.5424			446.476			8.0611 *
29-006-TP1B-B	119.271			96.6911	116.642			641.274			10.4617 *
29-006-TP1B-C	203.367				51.5509			881.609			6.80123 *
29-006-TP-1-COMP	139.844			82.4948	98.4217			654.812			14.819 *
29-006-WR-1	168.385			46.9754 *	123.477			736.375			9.8891 *
29-006-WR-1-COMP	131.85			68.0034 *	95.6198			814.539			9.97588 *
29-006-WR-2	142.802				97.6687			929.609			9.67143 *
29-006-WR-3	132.019			384.344	106.805			690.162	95.7343 *		11.2277 *
29-006-WR-4	148.631	50.7014 *			115.962			606.013			8.33362 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

NORWEGIAN
PA NO. 29-006

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: NORWEGIAN
PA NUMBER: 29-006

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.299
6	GW - TARGETS	WELLS - 1 MI. x 2.5		17.5
7		WELLS - 1 TO 4 MI		91
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	108.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1298
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.348
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	12
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	167
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.004
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	2
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.003
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	1
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.01**

SITE NAME: NORWEGIAN
PA NUMBER: 29-006

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	200
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	240
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**4.80**

PONY

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: ATLANTIC/PACIFIC **PA#:** 29-033

Date: September 16 and 18, 1993 **Time:** 0830/1130

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
S. Babits, Pioneer

Visitors: None

Weather/Seasonality Observations: 09/16/93: Cool (30°F); fog; slight breeze (5 mph). 09/18/93: Warm (60°F); clear; calm; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #1: Three ponds and leach pad; #2: Upper pit with one adit; #3: Lower pit with two adits; #4: TP-1; #5: WR-1 and SW-3. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): Caretaker is Tony Carberry, 685-3457. Lysimeter field lies west of heap leach and received CN- applications.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Adit discharge has elevated levels of Cu and Cd and should be treated. Tailings could be revegetated. Waste rock is steep and very large; it will be difficult to revegetate. The best alternative would be to fill in pits with the waste.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): ATLANTIC/PACIFIC PA#: 29-033

Legal Description: T 2S ;R 3W ;Sec. 20 , E 1/2 ___ 1/4 ___ 1/4
Sec. 21 , W 1/2 ___ 1/4 ___ 1/4

County: MADISON Mining District: PONY

Latitude: N 45° 38' 50" Longitude: W 111° 59' 20"

Primary Drainage Basin and Code: South Boulder River/10020005
Secondary Drainage Basin: Park Creek

USGS Quadrangle map name(s): Pony

Mine Type/Commodities: Hardrock/Silver, Gold

Activity Status: Active ___,Inactive/Exploration ___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact (Include address and phone when available): Oleta Box, c/o Chicago Mining Corp., P.O. Box 555, Pony, MT 59747. (406) 685-3329; Clyde Jackson, W 230 Columbia, Spokane, WA 99205. (509) 327-4861; Carmen Hansen, 5610 109th Street SW, Tacoma, WA 98499; Deerlodge National Forest.

Relationship to other mines/sites in the area/district: The Garnet Gold is located downstream on Cataract Creek approx. 3 miles. The Strawberry and Boss Tweed sites are located one drainage over to the north on Pony Creek.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7400'-8000', Slope 25°,
Aspect Mostly west

Land use: Mining X , Recreational X , Residential ___, Urban ___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 5 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine, grasses, sage

Access: roads - good ___,poor ___,4wd X ,trail ___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 14 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Park Creek flows south to north adjacent to the site. Park Creek flows into the South Boulder River approx. 2.5 miles from the site.

Mining/milling history, ore type/tenor, host rock, gangue: The mine was discovered in the 1870's. The 2900 Development Corp. received a permit in 1988. The ore body comprises of a fractured, silicified and mineralized zone in a large aplite dike on the granite-gneiss contact. Mineralization was chiefly auriferous pyrite.

Mine Operation?
Shafts - Yes___, No_X_, # ____, Comment
Adits - Yes_X_, No___, # _4_, Comment 1 partially collapsed in upper pit; 1 open at WR-1; 2 open in lower pit
Pits - Yes_X_, No___, # _2_, Comment Both have 100' highwalls
Placers - Yes___, No_X_, # ____, Comment
Other - Yes___, No_X_, # ____, Comment

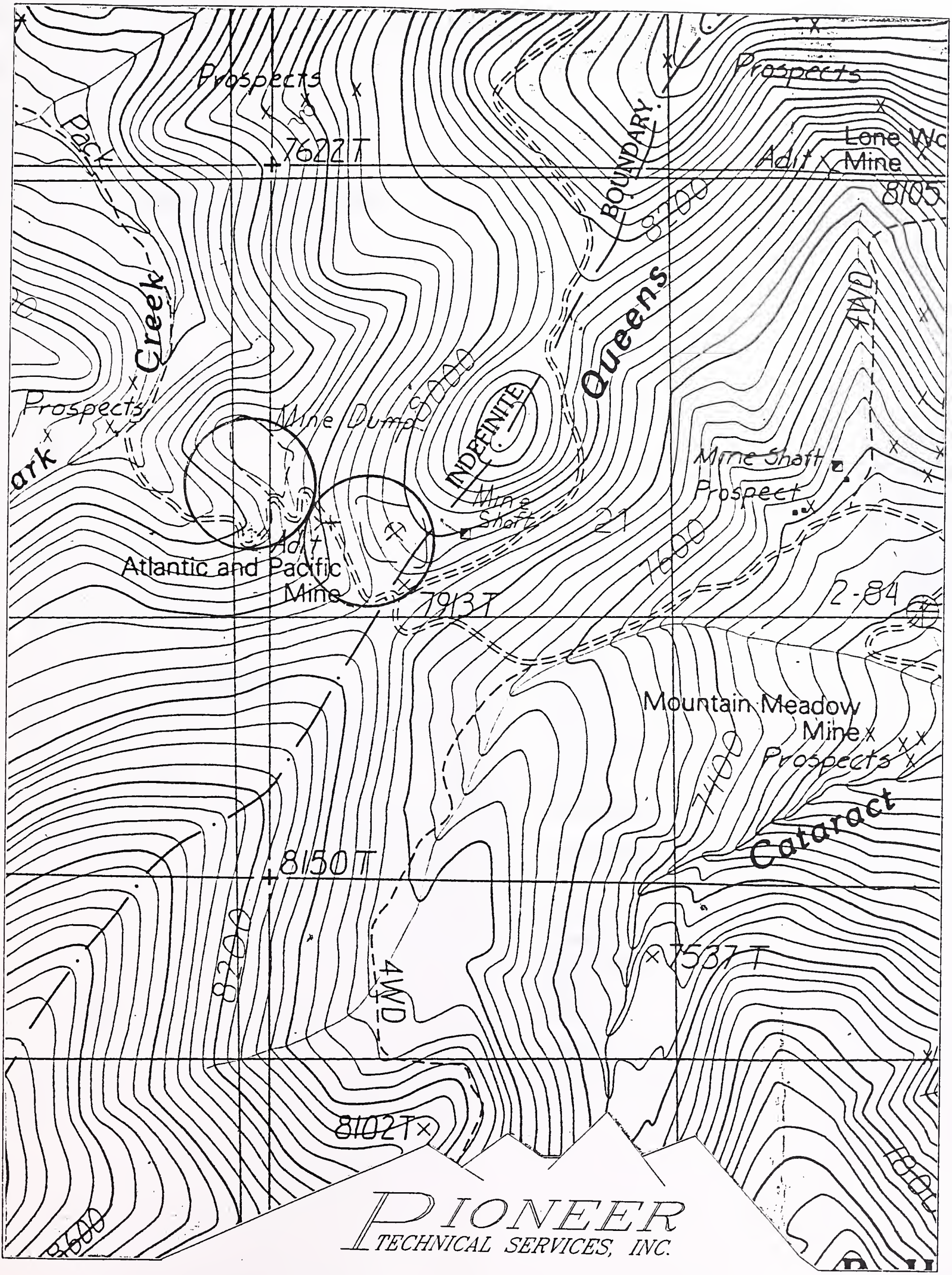
Mill Operation? Yes_X_, No___. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? History of the Atlantic/Pacific cites "preparations were being made to erect a 150-ton floatation plant."

ell No.	Location	Depth	Yield	Static Water Level
M:107321	02S 03W 18	150.0	4.0	20.00
M:127913	02S 03W 18	60.0	20.0	15.00
M:107320	02S 03W 18	202.0	8.0	20.00
M:107319	02S 03W 18	50.0	25.0	21.00
M:107322	02S 03W 18 ADD	35.0	0.0	0.00
M:107323	02S 03W 18 B	81.0	17.0	18.00
M:107324	02S 03W 18 BA	160.0	20.0	40.00
M:128046	02S 03W 18 BA	110.0	20.0	30.00
M:107325	02S 03W 18 BAA	19.0	10.0	9.00
M:107326	02S 03W 18 BAA	0.0	10.0	0.00
M:107327	02S 03W 18 BB	260.0	30.0	52.00
M:107328	02S 03W 18 BBB	0.0	7.0	130.00
M:125639	02S 03W 18 BDB	47.0	15.0	13.00
M:107329	02S 03W 21 CBC	81.0	0.0	59.00

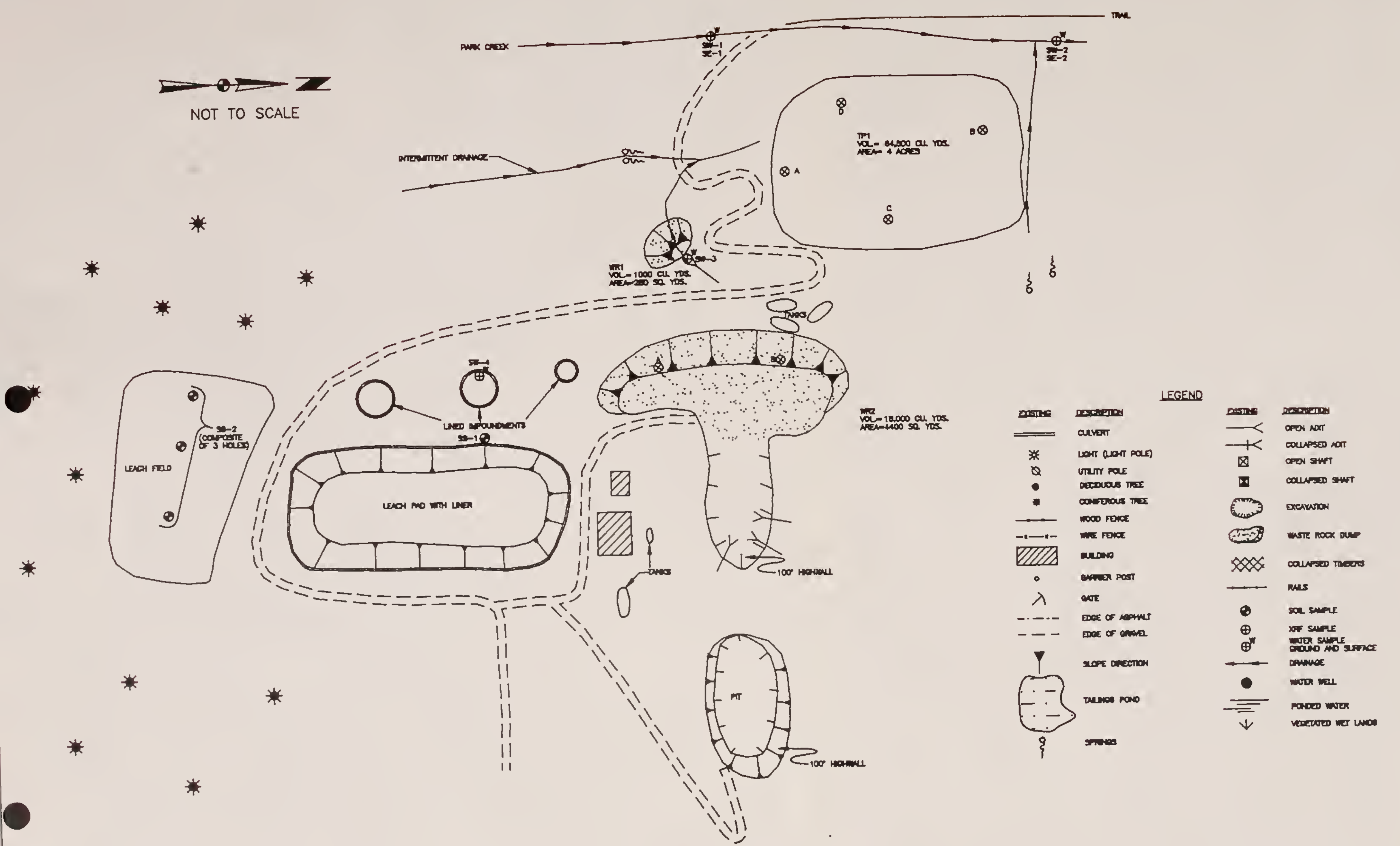


PIONEER
TECHNICAL SERVICES, INC.

ATLANTIC/PACIFIC, P.A. NO. 29-033

T02S, R03W, SECTION 20

SCALE: 1" = 1000'



DRAWN JTP DATE 7 DEC 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

ATLANTIC & PACIFIC PA# 29-033
PONY DISTRICT MADISON COUNTY

SHEET NO.

29-033.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. **TAILINGS IMPOUNDMENTS** - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): TP-1 fine sand over clay

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): Shallow end is 4 feet (A) at the deepest end; (C) depth not determined (> 15 feet).

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry on top and moist to saturated underneath.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): No impoundment; tailings were flumed onto knob.

Comments on potential for mitigation: Possible to recontour, amend, and revegetate.

SOURCE INVENTORY FORM

SAMPLERS: M. Babits, S. Babits, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	64,500	0-2', medium tan sand	None	7.0 (D)	0.04	29-033-TP-1	09/16/93 1700	T-Metals, ABA
TP-1A-B	TAIL		2-4', yellow clay	None	7.0 (D)	0.06			
TP-1B-A	TAIL		0-5', tan fine sand with clay lenses	None	7.0 (D)	0.06			
TP-1B-B	TAIL		5-10.5', tan fine sand with clay lenses	None	6.4 (D)	0.05	29-033-TP-2	09/16/93 1705	T-Metals, ABA, CN-
TP-1B-C	TAIL		10.5-12', gray clay moist	None	< 3.5 (D)	0.05			
TP-1B-D	TAIL		12-12.5', underlying soil, gravelly brown loam	None	6.0 (D)	0.05			
TP-1C-A	TAIL		0-5', medium tan sand	None	7.0 (D)	0.04			
TP-1C-B	TAIL		5-10', fine tan sand	None	6.8 (D)	0.05			
TP-1C-C	TAIL		10-15', reddish brown medium sand	None	7.0 (D)	0.05			
TP-1D-A	TAIL		0-3', medium orange tan sand	None	6.8 (D)	0.06			
TP-1D-B	TAIL		3.5-4.5', light orange tan clay	None	5.6 (D)	0.05			
TP-1D-C	TAIL		4.5-7.5', gray clay	None	5.4 (D)	0.04			
WR-1A	WR	1,000	South side of lower part	None	6.7 (D)	0.04	29-033-WR-1	09/18/93 1305	T-Metals, ABA
WR-1B	WR		North side of lower pit	None	7.0 (D)	0.01			
WR-2A	WR	18,000	West end of knob approx. 2' down	None	6.7 (D)	0.06	29-033-WR-2	09/18/93 1305	T-Metals, ABA
WR-2B	WR		West of adit mouth on north side of dump	None	7.0 (D)	0.07			
SS-1	SOIL		Soil at base of heap leach, nearest middle pond, grab; 0-6"	Lined	N/A	N/A	29-033-SS-1	09/16/93 1345	CN-
SS-2	SOIL		Soil composite of three holes in lysimeter field; 0-6"	None	N/A	N/A	29-033-SS-2	09/16/93 1430	CN-

*D-Direct reading (Kelway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 29-033-TP-1 is composite of TP-1A-A and -1A-B, TP-1B-A, TP-1C-A, and TP-1D-A and -1D-B. 29-033-TP-2 is composite of TP-1B-B and -1B-C, TP-1C-B and -1C-C, and TP-1D-C. 29-033-WR-1 is composite of WR-1A and -1B. 29-033-WR-2 is composite of WR-2A and -2B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes_X_, No___, Number:_1_ Identification:_At WR-1_

Filled shafts: Yes___, No_X_, Number:____ Identification:____

Seeps/Springs: Yes_X_, No___, Number:_2_ Identification:_Downgradient of WR-1 and north of TP-1_

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_18_

Distance to nearest well used for drinking?_2 miles_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Large uncontained sources with no significant elevated metals and discharging adit with elevated Cu and Cd.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Discharging adit at WR-2	12 gpm (E)	3.6	680	405	2.8	0	N/A	29-033-SW-3	09/16/93 1240	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ____, Name(s): Park Creek and several springs

Dry streambeds: Yes ____, No X, Name(s): ____

Other surface water: Yes X, No ____, Name(s)/Description: Discharging adit at WR-1

Waste materials within any floodplain: Yes X, No ____ Source ID(s): TP-1 is in Park Creek.

Approximate Flood frequency? X 1 yr, ____ 10 yr, ____ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 35 gpm during sampling
High Flow: 500 gpm, Average Flow: 50 gpm

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ____,
Describe: Adit at WR-1 is flowing through WR-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetland, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ____, Distance downstream (ft)? 100 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings are in Park Creek.

SURFACE WATER INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	In Park Creek, 5 feet upstream of where road crosses creek	8.3	181	230	6.4	35	35 gpm (E)	29-033-SW-1	09/18/93 1405	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-1	SE	In Park Creek, 5 feet upstream of where road crosses creek	N/A	N/A	N/A	N/A	N/A	N/A	29-033-SE-1	09/18/93 1405	T-Metals
SW-2	SW	In Park Creek, 30 feet downstream of spring that flows adjacent to TP-1	7.53	193	677	5.5	42	35 gpm (E)	29-033-SW-2	09/18/93 1345	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-2	SE	In Park Creek, 30 feet downstream of spring that flows adjacent to TP-1	N/A	N/A	N/A	N/A	N/A	N/A	29-033-SE-2	09/18/93 1345	T-Metals
SW-4	SW	Middle pond surface water	N/A	N/A	N/A	N/A	N/A	No flow	29-033-SW-4	09/16/93 1400	CN-

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 0

Wetlands present: Yes X, No ___, Describe: Streamside and at springs (very limited)

Carbonate rocks/soils: Yes ___, No X, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: M. Babits, S. Babits, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
TP-1	None	Dry	174,240	174,240	Yes	Moderate
WR-1	None	Dry	2,520	2,520	Yes	Low
WR-2	None	Dry	39,600	39,600	Yes	Low
SW-3	FEOX	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:

Population within 1 mile: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments

Evidence of recreational use on site: Yes X , No___, Describe: Shell casings

Accessibility - Fences, warning signs, closed roads? Fences were in place and locked; however, they are currently down because of vandalism.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment
Wilderness Area - Yes___, No X , Comment
T&E Species Habitat - Yes___, No X , Comment
Bat Habitat - Yes X , No___, Comment

Primary Drainage X ; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low X
Wetlands Frontage - High___, Medium___, Low X
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 3

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 3 , types and locations: One adit at WR-1 and two adits in lower open pit

Hazardous structures: Yes X , No___, Number 2 , types and locations: At base of WR-1, one steel building and one wood building

Unstable highwalls, pits, trenches, slopes: Yes X , No___, Number 2 , types and locations: Open pits with 100' highwalls (not unstable, just dangerous)

Unstable waste piles, impoundments, undercut banks: Yes____, No X ,
Number____, types and locations:

Fire and/or Explosion hazards: Yes X , No___, Explain: Wood building and frame of steel building

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MDHES/WQB, Environmental Assessment and Preliminary Environmental Review, 2900 Development Corporation, Atlantic and Pacific Mine, Pony, Montana, Prepared in assistance with Deer Lodge National Forest, Date Unknown.

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USBM, Gold Lode Mining in the Tobacco Root Mountains, Madison County, Montana, Information Circular 6972, Written by S.H. Lorain, November 1937.

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USGS, Topographic Map, Pony, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

ATLANTIC/PACIFIC
PA NO. 29-033

Atlantic & Pacific PA# 29−033
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 09/14/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29−033−SE−1	6.04 U	36.9	1.2 U	3.42	12.7	19.1	6290	0.033 U	123 J	15.1	8.28 U	7.99 UJ	15	NR
29−033−SE−2	6.25 U	55.7	1.2 U	3.29	4.53	17.6	8190	0.038 U	256 J	7.5	8.57 U	8.27 UJ	8.9	NR
29−033−TP−1	5.16 U	103	1.0 U	2.31	1.93	21.8	10600	0.049	173 J	2.35 U	27	6.83 UJ	5.41	NR
29−033−TP−2	4.05 U	187	0.8 U	1.88	2.74	18	19000	0.098	85.6 J	1.99	69.9	5.35 UJ	6.19	0.102 U
29−033−WR−1	4.98	145	0.8 U	7.43	3.85	61.6	19400	0.025 U	521 J	5.71	156	5.31 UJ	13.6	NR
29−033−WR−2	4.76 U	256	0.9 U	34.9	1.37	91	15500	0.242	6710 J	7.08	17.6	6.3 UJ	15.7	NR
29−033−SS−1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	16.1
29−033−SS−2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.609
BACKGROUND	20.1 J	168	0.8 U	10.7	31.5	29.2	21300	0.036 UJ	596	22	15.9	5.47 UJ	74.9	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29−033−TP−1	0.1	3.12	6.78	3.65	0.1	<0.01	<0.01	0	6.78
29−033−TP−2	0.26	8.12	0.24	−7.8	0.25	0.01	<0.01	0.31	−0.07
29−033−WR−1	0.15	4.69	0.27	−4.4	0.1	<0.01	0.05	0	0.27
29−033−WR−2	0.14	4.37	0.41	−3.9	0.14	<0.01	<0.01	0	0.41

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29−033−SW−1	1.29 J	23.4	4.59 U	5 U	6.24 U	6.37	50.8 JX	0.12 U	4.2	10.9 U	1.22 U	31.7 U	8.71 U	39.7
29−033−SW−2	5.61 J	31.1	4.59 U	5 U	6.24 U	12.6	79.2 JX	0.12 U	11.3	10.9 U	4.39 J	31.7 U	8.71 U	58.1
29−033−SW−3	3.38 J	16	7.37	158	6.24 U	2130	21200 JX	0.12 U	9220	29.3	3.59 J	31.7 U	112	172

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
29−033−SW−1	72	< 5	13	0.26	< 0.00
29−033−SW−2	124	< 5	25	0.43	< 0.00
29−033−SW−3	570	< 5	342	1.63	NR
29−033−SW−4	NR	NR	NR	NR	0.75

LEGEND

SE1 − In Park Creek, 5' upstream of where road crosses creek.
SE2 − In Park Creek, 30' downstream of spring that flows adjacent to tailings pond 1.
TP1 − Composite of subsamples TP1AA, 1AB, 1BA, 1CA, 1DA, and 1DB.
TP2 − Composite of subsamples TP1BB, 1BC, 1CB, 1CC, and 1DC.
WR1 − Composite of subsamples WR1A and 1B.
WR2 − Composite of subsamples WR2A and 2B.
BACKGROUND − From the Strawberry Mine (29−038 −SS−1).
SS1 − Base of heap leach nearest middle pond. Grab 0−6".
SS2 − Composite of 3 holes in lysimeter field.
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.
SW3 − Adit discharge at waste dump 2.
SW4 − Middle pond, Southwest.

XRF ANALYSIS RESULTS

ATLANTIC/PACIFIC
PA NO. 29-033

Mine Name: Atlantic and Pacific PA# 29-033
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-033-TP1A-A		34379.9	2172.08	671.991		416.845 *	10883			46.1117 *		193.62
29-033-TP1A-B		53216.2	2067.3	1274.02			17567.6			42.1048 *		198.698
29-033-TP1B-A		36701.4	1242.97	882.801			18007			36.9226 *		185.501
29-033-TP1B-B		34488.9	1324.7	704.082			14750.7			49.0919 *		195.75
29-033-TP1B-C		13450.4	1145.25	530.58 *			25214.2	267.171 *		46.3794 *		162.432
29-033-TP1B-D		14466.9	3962.67	1789.69	194.572 *	451.54 *	27530.1			121.46 *	41.638 *	240.373
29-033-TP1C-A		33324.2	1253.21	894.061			14927.4			31.5048 *		210.317
29-033-TP1C-B		34240.7	1505.18	974.982	169.266 *		12964.6			62.2702 *		212.134
29-033-TP1C-C		36634	1194.33	694.1			17904.4			52.1101 *		197.041
29-033-TP1D-A		35731.8	2021.21	842.935		423.518 *	10318.5			41.4824 *		192.918
29-033-TP1D-B		46425.8	2035.72	1116.06		240.23 *	16190.2			51.2526 *		195.15
29-033-TP1D-C		53776.3	2503.23	1316.2		525.265 *	23054.6			46.5801 *		156.707
29-033-TP-1-COMP		39428.7	1829.62	963.635		265.439 *	13307.9					195.243
29-033-TP-1-COMP-DUP		42833.5	1982.29	846.409		313.846 *	13511.7			65.3204 *		201.792
29-033-TP-2-COMP		38440.5	1480.53	1035.09	185.667 *		16732.4					203.139
29-033-WR1-A		29239.7	4074.73	1918.85		1577.43	31718.6		61.9105 *	90.6009 *		271.894
29-033-WR1-B		40400	1312.94	981.018			29762.6			53.9722 *		185.158
29-033-WR2-A		28336.5	3025.46	843.983		19934	39262.6		119.265 *	89.2121 *		329.998
29-033-WR2-B		44899.1	1573.99	1015.09			21913.5			54.3799 *		325.656
29-033-WR-1-COMP		32877.5	4249.18	1662.23		670.189 *	31895.7		69.6949 *	57.3891 *		216.103
29-033-WR-2-COMP		33057.8	3134.64	879.278		10973.2	31167.4		88.0817 *	66.4836 *		246.49

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-033-TP1A-A	112.232				168.876			895.097		14.6922 *	17.0656 *
29-033-TP1A-B	122.403			27.4876 *	230.816			916.574		20.2061 *	25.8243
29-033-TP1B-A	124.055			56.2821 *	168.975			861.253			13.6589 *
29-033-TP1B-B	114.579		3.51988 *	29.5344 *	166.289			836.684			16.4154 *
29-033-TP1B-C	101.516										
29-033-TP1B-D	177.09				118.496			508.813			17.4475 *
29-033-TP1C-A	131.051		4.00638 *		141.037			859.681		10.3666 *	20.3261
29-033-TP1C-B	143.369				167.079			956.608			18.6199 *
29-033-TP1C-C	128.662			32.8533 *	157.467			913.961		11.325 *	15.732 *
29-033-TP1D-A	119.525				173.799			741.602			21.0603
29-033-TP1D-B	113.543		8.86594 *		220.902			791.057		12.0225 *	27.1563
29-033-TP1D-C	98.1974			27.5482 *	269.788			671.699		13.5681 *	27.2625
29-033-TP-1-COMP	133.085			17.3385 *	201.698			902.884		16.3175 *	27.0118
29-033-TP-1-COMP-	136.705				205.603			919.51		18.3456 *	24.8034
29-033-TP-2-COMP	127.138			40.4931 *	195.489			1022.48			22.9185
29-033-WR1-A	170.256			21.4792 *	166.643			804.09		14.217 *	18.0719 *
29-033-WR1-B	128.51			401.462	231.156			441.762			17.964 *
29-033-WR2-A	125.949		4.46661 *		167.013			1262.07	87.9131 *	10.2112 *	25.4943
29-033-WR2-B	133.537		13.198 *	24.4808 *	261.366			570.511			23.6797
29-033-WR-1-COMP	162.136	38.8671 *		159.499	200.931			644.793	112.653 *		
29-033-WR-2-COMP	138.668	55.9422 *			225.949			702.959		16.349 *	13.511 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

ATLANTIC & PACIFIC
PA NO. 29-033

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: ATLANTIC/PACIFIC
PA NUMBER: 29-033

GROUNDWATER PATHWAY

LINE NO.				
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.890
6	GW - TARGETS	WELLS - 1 MI. x 2.5		35.0
7		WELLS - 1 TO 4 MI		4
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	39.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	29484

SURFACE WATER PATHWAY

11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.504
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	33804

AIR PATHWAY

25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.016
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	30
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	36

DIRECT CONTACT PATHWAY

36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.014
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	3
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	4

45 **TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**
(LINES 10 + 24 + 35 + 44) / 100,000 **0.63**

SITE NAME: ATLANTIC/PACIFIC
PA NUMBER: 29-033

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		10
2	HAZARDS	OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	150
4		UNSTAB. HIWALLS / PITS	75 EA.	150
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	380
9	TARGETS	POPULATION - 1 MILE		1
10		NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	3
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**11.40**

SUMMARY OF HISTORICAL ANALYTICAL DATA
FROM OTHER SOURCES

NORRIS LABORATORY
P.O. Box 2882
Norris, Montana 59745

10/18/89	pH	ORP (mv)	Free Chlorine (ppm)	Total Chlorine (ppm)	Free Cyanide (ppm)	WAD Cyanide (ppm)	Total Cyanide (ppm)
10/20 11:30 am CN Discharge	7.80	>+700	156.6	187.5	<0.005	0.008	0.016

Analytical Chemist ____________________

NORRIS LABORATORY
P.O. Box 2882
Norris, Montana 59745

10/18/89	pH	ORP (mv)	Free Chlorine (ppm)	Total Chlorine (ppm)	Free Cyanide (ppm)	WAD Cyanide (ppm)	Total Cyanide (ppm)
10/27 8:00am CN Discharge	7.50	>+700	98.25	173.5	<0.005	0.009	0.005

Analytical Chemist ______________

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800-873-5227

LABORATORY REPORT

TO: 2900 Development Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-13638
DATE: 09/22/89 dya

WATER ANALYSIS

1
Sampled 08/24/89 @ 1100
Submitted 08/28/89

Park Ck-above
Amy Access Rd
(upstream surface control,

Constituent	mg/l	
Potassium	<1	
Sodium	2	
Calcium	7	
Magnesium	2	
Sulfate	4	
Chloride	2	
Carbonate	0	
Bicarbonate	36	
Nitrate plus Nitrite as N	0.05	
Total Dissolved Solids @ 180°C	44	
Total Hardness as CaCO3	26	
Total Alkalinity as CaCO3	30	
Specific Conductance @ 25°C	53	µmhos/cm
pH, s.u.	7.6	
Total Kjeldahl Nitrogen	0.4	
Total Phosphorus as P	0.01	
Ortho-phosphate as P	<0.01	
Total Cyanide	<0.005	
Weak Acid Dissociable Cyanide	N/A	
Total Suspended Solids	5	

	mg/l	
Metals:	Total	Dissolved
Aluminum	<0.1	<0.1
Arsenic	<0.005	<0.005
Cadmium	<0.001	<0.001
Chromium	<0.02	<0.02
Copper	<0.01	<0.01
Iron	<0.03	<0.03
Lead	<0.01	<0.01
Manganese	<0.02	<0.02
Mercury	<0.001	<0.001
Nickel	<0.03	<0.03
Silver	<0.005	<0.005
Zinc	<0.01	<0.01

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LABORATORY REPORT

TO: 2900 Development Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-13639
DATE: 09/22/89 dya

WATER ANALYSIS

2
Sampled 08/24/89 @ 1000
Submitted 08/28/89

Park Ch below Amy (downstream surface water)

Constituent	mg/l	
Potassium	1	
Sodium	3	
Calcium	15	
Magnesium	5	
Sulfate	22	
Chloride	2	
Carbonate	0	
Bicarbonate	48	
Nitrate plus Nitrite as N	0.27	
Total Dissolved Solids @ 180°C	80	
Total Hardness as CaCO3	57	
Total Alkalinity as CaCO3	39	
Specific Conductance @ 25°C	103	µmhos/cm
pH, s.u.	7.6	
Total Kjeldahl Nitrogen	0.3	
Total Phosphorus as P	0.02	
Ortho-phosphate as P	<0.01	
Total Cyanide	<0.005	
Weak Acid Dissociable Cyanide	N/A	
Total Suspended Solids	15	

	mg/l	
Metals:	Total	Dissolved
Aluminum	<0.1	<0.1
Arsenic	<0.005	<0.005
Cadmium	0.002	<0.001
Chromium	<0.02	<0.02
Copper	<0.01	<0.01
Iron	0.09	<0.03
Lead	0.01	<0.01
Manganese	<0.02	<0.02
Mercury	<0.001	<0.001
Nickel	<0.03	<0.03
Silver	<0.005	<0.005
Zinc	0.02	0.02

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LABORATORY REPORT

TO: 2900 Development Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-13640
DATE: 09/22/89 dya

WATER ANALYSIS
3
Sampled 08/24/89 @ 1300
Submitted 08/28/89

Cataract Ck
below A & P Pad

Constituent	mg/l
Potassium	1
Sodium	2
Calcium	9
Magnesium	3
Sulfate	6
Chloride	2
Carbonate	0
Bicarbonate	47
Nitrate plus Nitrite as N	<0.05
Total Dissolved Solids @ 180°C	45
Total Hardness as CaCO3	36
Total Alkalinity as CaCO3	39
Specific Conductance @ 25°C	68 µmhos/cm
pH, s.u.	7.7
Total Kjeldahl Nitrogen	0.6
Total Phosphorus as P	<0.01
Ortho-phosphate as P	<0.01
Total Cyanide	<0.005
Weak Acid Dissociable Cyanide	N/A
Total Suspended Solids	2

	mg/l	
Metals:	Total	Dissolved
Aluminum	<0.1	<0.1
Arsenic	<0.005	<0.005
Cadmium	0.002	0.001
Chromium	<0.02	<0.02
Copper	<0.01	<0.01
Iron	<0.03	<0.03
Lead	<0.01	<0.01
Manganese	<0.02	<0.02
Mercury	<0.001	<0.001
Nickel	<0.03	<0.03
Silver	<0.005	<0.005
Zinc	0.02	0.01

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LABORATORY REPORT

TO: 2900 Development Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-13642
DATE: 09/22/89 dya

WATER ANALYSIS
4
Sampled 08/24/89 @ 1130
Submitted 08/28/89

A my production
spring

Constituent	mg/l	
Potassium	2	
Sodium	2	
Calcium	14	
Magnesium	5	
Sulfate	7	
Chloride	4	
Carbonate	0	
Bicarbonate	63	
Nitrate plus Nitrite as N	0.08	
Total Dissolved Solids @ 180°C	69	
Total Hardness as CaCO3	54	
Total Alkalinity as CaCO3	52	
Specific Conductance @ 25°C	98	µmhos/cm
pH, s.u.	7.9	
Total Kjeldahl Nitrogen	0.2	
Total Phosphorus as P	<0.01	
Ortho-phosphate as P	<0.01	
Total Cyanide	<0.005	
Weak Acid Dissociable Cyanide	N/A	
Total Suspended Solids	2	

Total Metals:

Aluminum	<0.1
Arsenic	<0.005
Cadmium	0.002
Chromium	<0.02
Copper	<0.01
Iron	<0.03
Lead	<0.01
Manganese	<0.02
Mercury	<0.001
Nickel	<0.03
Silver	<0.005
Zinc	<0.01

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LABORATORY REPORT

TO: 2900 Development Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-13643
DATE: 09/22/89 dya

WATER ANALYSIS
5
Sampled 08/24/89 @ 1200
Submitted 08/28/89

Holland tunnel
Q (from Amy?)

Constituent	mg/l	
Potassium	1	
Sodium	5	
Calcium	52	
Magnesium	12	
Sulfate	264	
Chloride	1	
Carbonate	0	
Bicarbonate	<1	
Nitrate plus Nitrite as N	0.47	
Total Dissolved Solids @ 180°C	441	
Total Hardness as CaCO3	179	
Total Alkalinity as CaCO3	<1	
Specific Conductance @ 25°C	501	µmhos/cm
pH, s.u.	3.4	
Total Kjeldahl Nitrogen	0.3	
Total Phosphorus as P	<0.01	
Ortho-phosphate as P	<0.01	
Total Cyanide	<0.005	
Weak Acid Dissociable Cyanide	N/A	
Total Suspended Solids	2	

Total Metals:

Aluminum	9.9
Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.02
Copper	1.13
Iron	2.27
Lead	<0.01
Manganese	7.27
Mercury	<0.001
Nickel	<0.03
Silver	<0.005
Zinc	0.07

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LABORATORY REPORT

TO: 2900 Development Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-13644
DATE: 09/22/89 dya

WATER ANALYSIS
6
Sampled 08/24/89 @ 1230
Submitted 08/28/89

Developed spring
in area –
T2SR3W
Sect 16

Constituent	mg/l
Potassium	3
Sodium	2
Calcium	20
Magnesium	7
Sulfate	7
Chloride	<1
Carbonate	0
Bicarbonate	92
Nitrate plus Nitrite as N	0.34
Total Dissolved Solids @ 180°C	87
Total Hardness as CaCO3	78
Total Alkalinity as CaCO3	75
Specific Conductance @ 25°C	129 µmhos/cm
pH, s.u.	7.9
Total Kjeldahl Nitrogen	0.3
Total Phosphorus as P	0.01
Ortho-phosphate as P	<0.01
Total Cyanide	<0.005
Weak Acid Dissociable Cyanide	N/A
Total Suspended Solids	3
Total Metals:	
Aluminum	<0.1
Arsenic	<0.005
Cadmium	<0.001
Chromium	<0.02
Copper	<0.01
Iron	0.04
Lead	<0.01
Manganese	<0.02
Mercury	<0.001
Nickel	<0.03
Silver	<0.005
Zinc	0.01

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LABORATORY REPORT

TO: 2900 Development Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-13641
DATE: 09/22/89 dya

WATER ANALYSIS
7
Sampled 08/24/89 @ 1030
Submitted 08/28/89

Park Ck
below Spring; Park
Ck conf.

Constituent	mg/l	
Potassium	2	
Sodium	3	
Calcium	16	
Magnesium	5	
Sulfate	23	
Chloride	2	
Carbonate	0	
Bicarbonate	51	
Nitrate plus Nitrite as N	0.22	
Total Dissolved Solids @ 180°C	79	
Total Hardness as CaCO3	59	
Total Alkalinity as CaCO3	42	
Specific Conductance @ 25°C	110	µmhos/cm
pH, s.u.	7.8	
Total Kjeldahl Nitrogen	0.4	
Total Phosphorus as P	0.01	
Ortho-phosphate as P	<0.01	
Total Cyanide	<0.005	
Weak Acid Dissociable Cyanide	N/A	
Total Suspended Solids	3	

	mg/l	
Metals:	Total	Dissolved
Aluminum	<0.1	<0.1
Arsenic	<0.005	<0.005
Cadmium	<0.001	<0.001
Chromium	<0.02	<0.02
Copper	<0.01	<0.01
Iron	<0.03	<0.03
Lead	0.01	<0.01
Manganese	<0.02	<0.02
Mercury	<0.001	<0.001
Nickel	<0.03	<0.03
Silver	<0.005	<0.005
Zinc	0.03	0.02

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LABORATORY REPORT

TO: Chicago Mining Corporation
ADDRESS: Steve Schurman
P.O. Box 555
Pony, MT 59747

LAB NO.: 89-18923
DATE: 11/14/89 dya

DISCHARGE 1

WATER ANALYSIS

Detox Pond
Sampled 10/14/89 @ 1830
Submitted 10/19/89

Constituent	mg/l	
pH, s.u.	7.4	
Specific Conductance @ 25°C	7200	µmhos/cm
Total Dissolved Solids @ 180°C	5880	
Dissolved:		
Arsenic	<0.005	
Cadmium	<0.001	
Copper	1.70	
Lead	<0.01	
Mercury	0.002	
Zinc	0.13	

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LABORATORY REPORT

TO: 2900 Development Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-19197
DATE: 11/15/89 dya

DISCHARGE 2

WATER ANALYSIS

Detox Pond
Sampled 10/20/89 @ 11:30 a.m.
Submitted 10/24/89

Constituent		
pH, s.u.	7.6	
Specific Conductance @ 25°C	7390	µmhos/cm
Total Dissolved Solids @ 180°C	5940	mg/l
Metals:		
Arsenic	<0.005	
Cadmium	<0.001	
Copper	2.40	
Lead	<0.01	
Mercury	0.001	
Zinc	0.04	

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LABORATORY REPORT

TO: Chicago Mining Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-19821
DATE: 11/20/89 dya

DISCHARGE 3

WATER ANALYSIS

A & P Mine
CN Detox
Sampled 10/27/89 @ 11:30 a.m.
Submitted 11/02/89

Constituent	mg/l	
pH, s.u.	7.4	
Specific Conductance @ 25°C	6630	µmhos/cm
Total Dissolved Solids @ 180°C	4660	
Metals:		
Arsenic	<0.005	
Cadmium	<0.001	
Copper	0.15	
Lead	<0.01	
Mercury	<0.001	
Zinc	<0.01	

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LABORATORY REPORT

TO: Chicago Mining Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-20537
DATE: 12/12/89 dya

LAD SOIL ANALYSIS

SPECIAL ANALYSIS

AP-1
Submitted 11/22/89

Constituent	Detection Limit, mg/kg	in sample, mg/kg
Arsenic	5	<5
Cadmium	1	<1
Copper	1	23
Lead	5	7
Zinc	1	21
Mercury	1	<1

NOTE: Analysis performed on digestate of EPA method 3050.

ENERGY
LABORATORIES

ENERGY LABORATORIES, INC.
P O BOX 30916 • 1107 SOUTH BROADWAY • BILLINGS MT 59107-0916 • PHONE (406) 252-6325
800-873-5227

LABORATORY REPORT

TO: Chicago Mining Corporation
ADDRESS: P.O. Box 555
Pony, MT 59747

LAB NO.: 89-20538
DATE: 12/12/89 dya

LAD SOIL ANALYSIS

SPECIAL ANALYSIS

AP-2
Submitted 11/22/89

Constituent	Detection Limit, mg/kg	in sample, mg/kg
Arsenic	5	<5
Cadmium	1	<1
Copper	1	20
Lead	5	6
Zinc	1	36
Mercury	1	<1

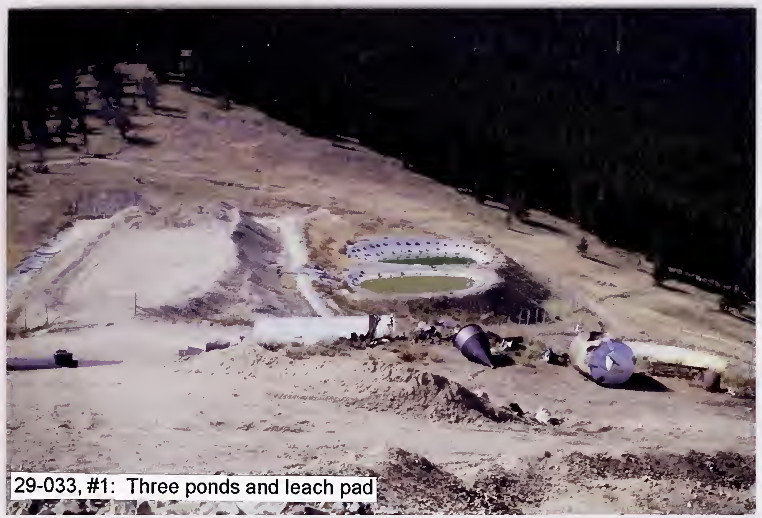
NOTE: Analysis performed on digestate of EPA method 3050.

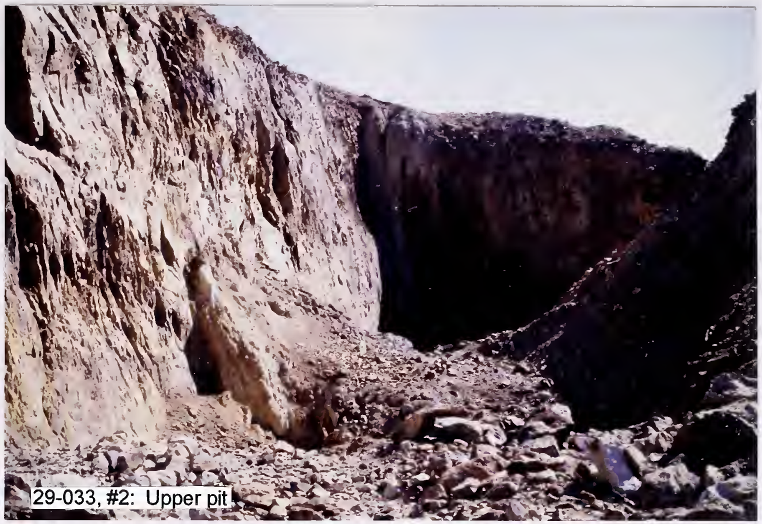
LAB ID	SAMPLE ID	Cr	Crc	Crq	Ni	Nic	Niq	Cu	Cuc	Cuq	Zn	Znc	Znq	As	Asc	Asq	Ag	Agc	Agq
DISSOLVED METALS: (ppb)																			
92Q1067	DLQS10L	-1.69	U		0.38	U		1.09	U		7.87	B		8.18	B		-1.14	U	
TOTAL RECOVERABLE METALS: (ppb)																			
92Q1068	DLQS10L	0.00	U		0.00	U		0.00	U		7.39	B		10.60	B		0.00	U	

ATLANTIC AND PACIFIC MINE

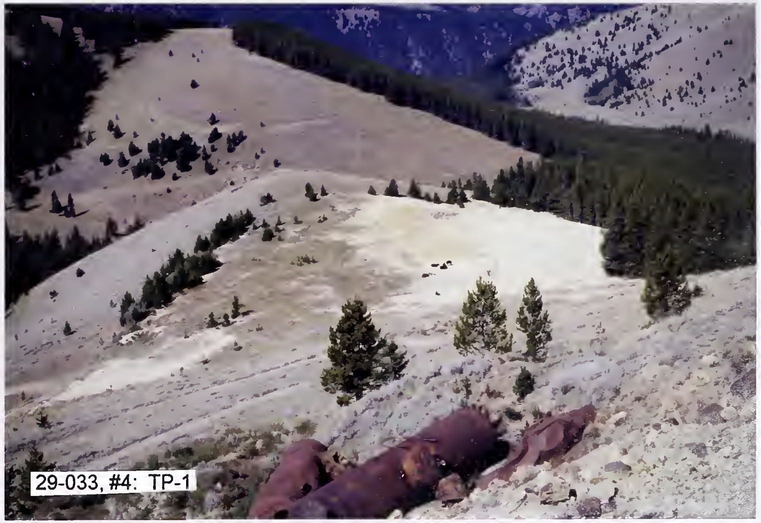
LAB ID	SAMPLE ID	Cr	Crc	Crq	Ni	Nic	Niq	Cu	Cuc	Cuq	Zn	Znc	Znq	As	Asc	Asq	Ag	Agc	Agq
DISSOLVED METALS: (ppb)																			
92Q1189	JAPS10M	-1.60	U		-0.47	U		0.37	U		3.18	U		-0.69	U		-1.13	U	
92Q1172	JAPS20H	-0.95	U		8.35	B		1044.00			76.46			-0.63	U		-1.08	U	
92Q1176	JAPS30L	-1.03	U		0.08	U		15.21	B		72.17			-0.68	U		-1.14	U	
92Q1184	JAPS40M	-1.38	U		-0.53	U		0.06	U		3.71	U		-0.63	U		-1.13	U	
92Q1182	JAPS50L	-1.30	U		-0.16	U		-0.32	U		2.07	U		-0.75	U		-1.13	U	
92Q1187	JAPS60L	-1.37	U		-0.48	U		0.20	U		2.09	U		-0.69	U		-1.11	U	
92Q1185	JAPS70L	-0.88	U		0.07	U		0.80	U		7.79	B		-0.36	U		-0.86	U	
92Q1180	JAPS80L	-1.01	U		-0.65	U		0.08	U		6.38	B		-0.61	U		-1.10	U	
92Q1178	JAPS90L	-1.07	U		-0.55	U		0.55	U		2.85	U		-0.62	U		-1.04	U	
92Q1174	JAPSA0H	-1.01	U		8.09	B		1015.92			75.33			-0.57	U		-1.08	U	
92Q1171	JAPSB0L	-1.53	U		-1.20	U		-0.58	U		1.85	U		-0.92	U		-1.11	U	
92Q1170	JAPTRIP	-1.72	U		-1.24	U		-0.97	U		0.75	U		-0.92	U		-1.12	U	
TOTAL RECOVERABLE METALS: (ppb)																			
92Q1190	JAPS10M	0.00	U		0.00	U		0.00	U		3.04	U		0.00	U		0.00	U	
92Q1173	JAPS20H	0.00	U		9.08	B		3291.00			66.85			1.63	B		0.00	U	
92Q1177	JAPS30L	0.00	U		0.00	U		10.23	B		0.00	U		0.00	U		0.00	U	
92Q1183	JAPS50L	0.00	U		0.00	U		0.00	U		0.00	U		0.00	U		0.00	U	
92Q1188	JAPS60L	0.00	U		0.00	U		0.00	U		0.00	U		0.00	U		0.00	U	
92Q1186	JAPS70L	0.00	U		0.00	U		0.00	U		0.00	U		1.48	B		0.00	U	
92Q1181	JAPS80L	2.18	B		0.00	U		0.00	U		0.00	U		1.57	B		0.00	U	
92Q1179	JAPS90L	0.00	U		0.00	U		0.00	U		0.00	U		1.45	B		0.00	U	
92Q1175	JAPSA0H	0.00	U		8.79	B		2771.00			70.28			1.52	B		0.00	U	
TOTAL METALS: (ppm)																			
92S1192	JAPD10H	17.11	B		10.86	B		19.10	B	*	31.83	B	N*	6.94	B	*	0.00	U	*
92S1193	JAPT20H	2.45	B		1.04	B		47.09	B	*	17.35	B	N*	0.86	U	*	0.00	U	*
92S1194	JAPT30H	2.95	B		1.81	B		54.20		N	26.66	B		1.10	U		0.00	U	
92S1191	JAPSTRP	0.00	U		0.00	U		0.00	U	*	3.15	U	N*	0.00	U	*	0.00	U	*

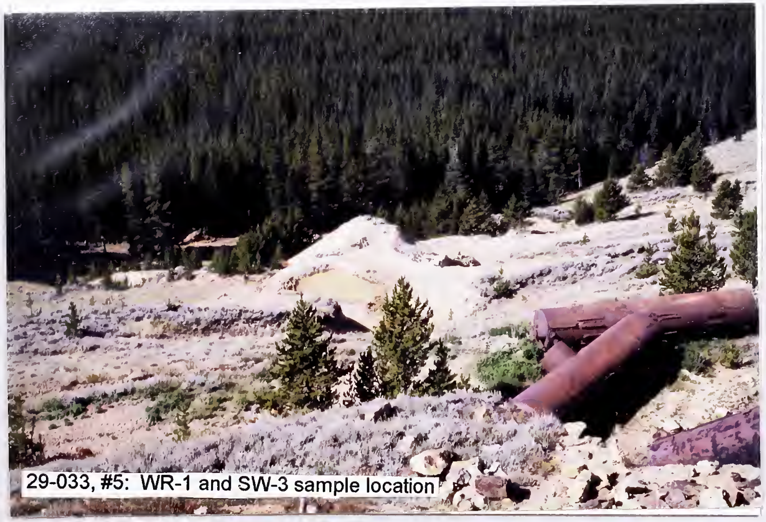
LAB ID	SAMPLE ID	Cd	Cdc	Cdq	Ba	Bac	Baq	Pb	Pbc	Pbq	Hg	Hgc	Hgq
DISSOLVED METALS: (ppb)													
92Q1067	DLQS10L	-0.79	U		84.63	B		-0.96	U				
TOTAL RECOVERABLE METALS: (ppb)													
92Q1068	DLQS10L	0.00	U		92.34	B		0.00	U		0.09	B	
ATLANTIC AND PACIFIC MINE													
DISSOLVED METALS: (ppb)													
92Q1189	JAPS10M	-0.85	U		30.55	B		-1.04	U				
92Q1172	JAPS20H	3.15	B		17.67	B		3.61					
92Q1176	JAPS30L	-0.67	U		29.73	B		-0.80	U				
92Q1184	JAPS40M	-0.93	U		42.40	B		-1.08	U				
92Q1182	JAPS50L	-0.92	U		34.85	B		-1.06	U				
92Q1187	JAPS60L	-0.88	U		34.16	B		-0.87	U				
92Q1185	JAPS70L	-0.49	U		36.67	B		-0.81	U				
92Q1180	JAPS80L	-0.85	U		17.80	B		-0.91	U				
92Q1178	JAPS90L	-0.82	U		17.25	B		-0.78	U				
92Q1174	JAPSA0H	3.40	B		18.01	B		3.94					
92Q1171	JAPSB0L	-0.84	U		-1.75	U		-1.12	U				
92Q1170	JAPTRIP	-0.91	U		-1.58	U		-1.11	U				
TOTAL RECOVERABLE METALS: (ppb)													
92Q1190	JAPS10M	0.00	U		39.21	B		0.00	U		0.07	B	
92Q1173	JAPS20H	1.88	B		30.86	B		3.00	B		0.14	B	
92Q1177	JAPS30L	0.00	U		28.41	B		0.00	U		0.20		
92Q1183	JAPS50L	0.00	U		34.04	B		0.00	U		0.09	B	
92Q1188	JAPS60L	0.00	U		35.19	B		0.00	U		0.08	B	
92Q1186	JAPS70L	0.00	U		41.02	B		0.00	U		0.18	B	
92Q1181	JAPS80L	0.00	U		29.11	B		0.00	U		0.10	B	
92Q1179	JAPS90L	0.00	U		20.07	B		0.00	U		0.09	B	
92Q1175	JAPSA0H	2.05	B		24.48	B		3.45	B		0.08	B	
TOTAL METALS: (ppm)													
92S1192	JAPD10H	0.00	U		143.88	B	N*	19.09			0.47		
92S1193	JAPT20H	0.00	U		198.43	B	N*	41.26			1.36		
92S1194	JAPT30H	0.00	U		198.22	B		46.28		N	0.90		
92S1191	JAPSTRP	0.00	U		0.00	U	N*	0.00	U		0.31	B	


29-033, #1: Three ponds and leach pad


29-033, #2: Upper pit

29-033, #3: Lower pit


29-033, #4: TP-1



29-033, #5: WR-1 and SW-3 sample location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BOSS TWEED PA#: 29-034

Date: September 14 and 15, 1993 Time: 1600/0830

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
S. Babits, Pioneer

Visitors: None

Weather/Seasonality Observations: Cool and snowy to warm (60°F); slight breeze; snow on September 13; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): Photos taken were misplaced. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): The Pathfinder Mine is named on the door of a building at the site.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Adit discharges are near neutral pH and may not need treatment. Tailings are steep and large. TP-3 has elevated Hg. Tailings will be difficult to revegetate but should at least be bermed from the creek. Waste rock is also large and steep and will be difficult to revegetate but not enough metals for processing.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BOSS TWEED **PA#:** 29-034

Legal Description: T 2S ;R 3W ;Sec. 15 , SW1/4 NE1/4 ___1/4

County: MADISON **Mining District:** PONY

Latitude: N 45° 39' 50" **Longitude:** W 111° 57' 20"

Primary Drainage Basin and Code: North Willow Creek/10020005
Secondary Drainage Basin: Pony Creek

USGS Quadrangle map name(s): Pony

Mine Type/Commodities: Hardrock/Gold, Silver, Copper, Iron

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): William B. Murray, c/o Mrs. William B. Murray, 5670 SW Menefee Drive, Portland, OR 97201. (503) 246-3511; Pathfinder Exploration Corp., 255 Glendale Avenue, Suite 26, Sparks, NV 89431.

Relationship to other mines/sites in the area/district: The Strawberry Mine is one mile east on Pony Creek. There are numerous prospects in area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7000'-8400' , Slope Steep 30° , Aspect South

Land use: Mining X , Recreational___, Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 8 acres.
Dimensions:

Predominant vegetation types: Pine, juniper, sage, bunch grass, thistle

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites). TP-1, -2 and -3 only accessed by foot; a locked gate would mean accessing waste rock on a different road.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by gneisses and schists cut by quartz monzonite; gold in gneiss. Pony Creek flows west to east adjacent to the site and enter North Willow Creek 2.5 miles downstream.

Mining/milling history, ore type/tenor, host rock, gangue: From 1904 to 1935, Boss Tweed produced 44,223 ounces of silver and 57,090 pounds of copper from 171,415 tons of ore. Ore consists of fractured silicified and mineralized gneiss. Mineralization is chiefly auriferous pyrite, free gold, and quartz disseminated and in veinlets in a rock composed of quartz, orthoclase, plagioclase, chlorite, muscovite and epidote (rare). In June 1936, a 100-ton flotation mill was present on site.

Mine Operation?
Shafts - Yes___, No X, # ____, Comment
Adits - Yes X, No___, # 10, Comment WR-1, 2, 5, 7, 9, open; WR-3, 4, 6, 8, 10, coll.
Pits - Yes___, No X, # ____, Comment
Placers - Yes___, No X, # ____, Comment
Other - Yes___, No X, # ____, Comment

Mill Operation? Yes X, No____. **If yes answer the next three questions:**

Period(s) of Operation: In June 1936, a 100-ton flotation mill was present on site.

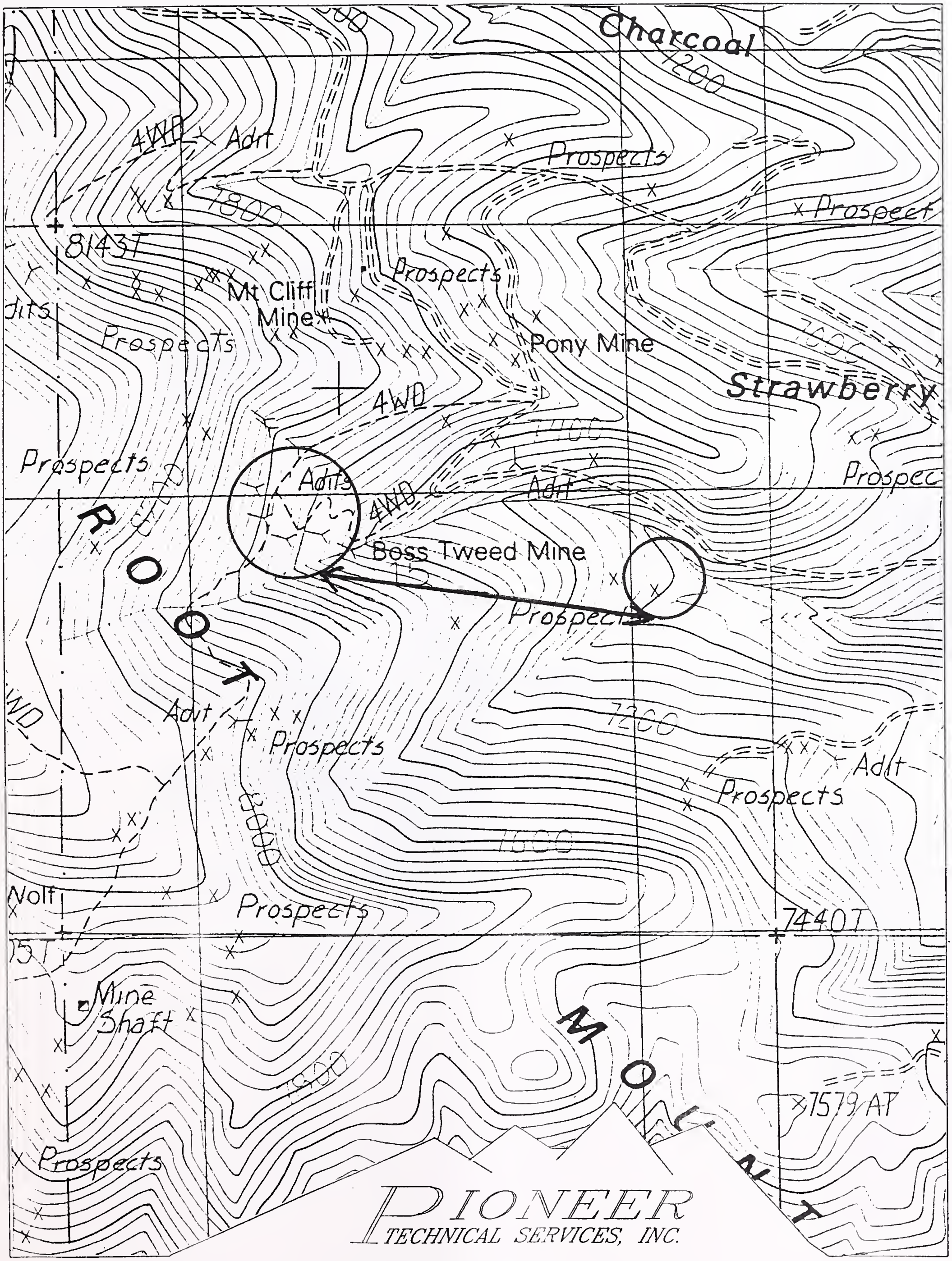
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Flotation uses ethyl xanthate, pine oil, aerofloat, copper sulphate, and soda ash.

Montana Bureau of Mines and Geology
Water Well Log Data

11/15/1993

Well No.	Location	Depth	Yield	Static Water Level
M:107329	02S 03W 21 CBC	81.0	0.0	59.00

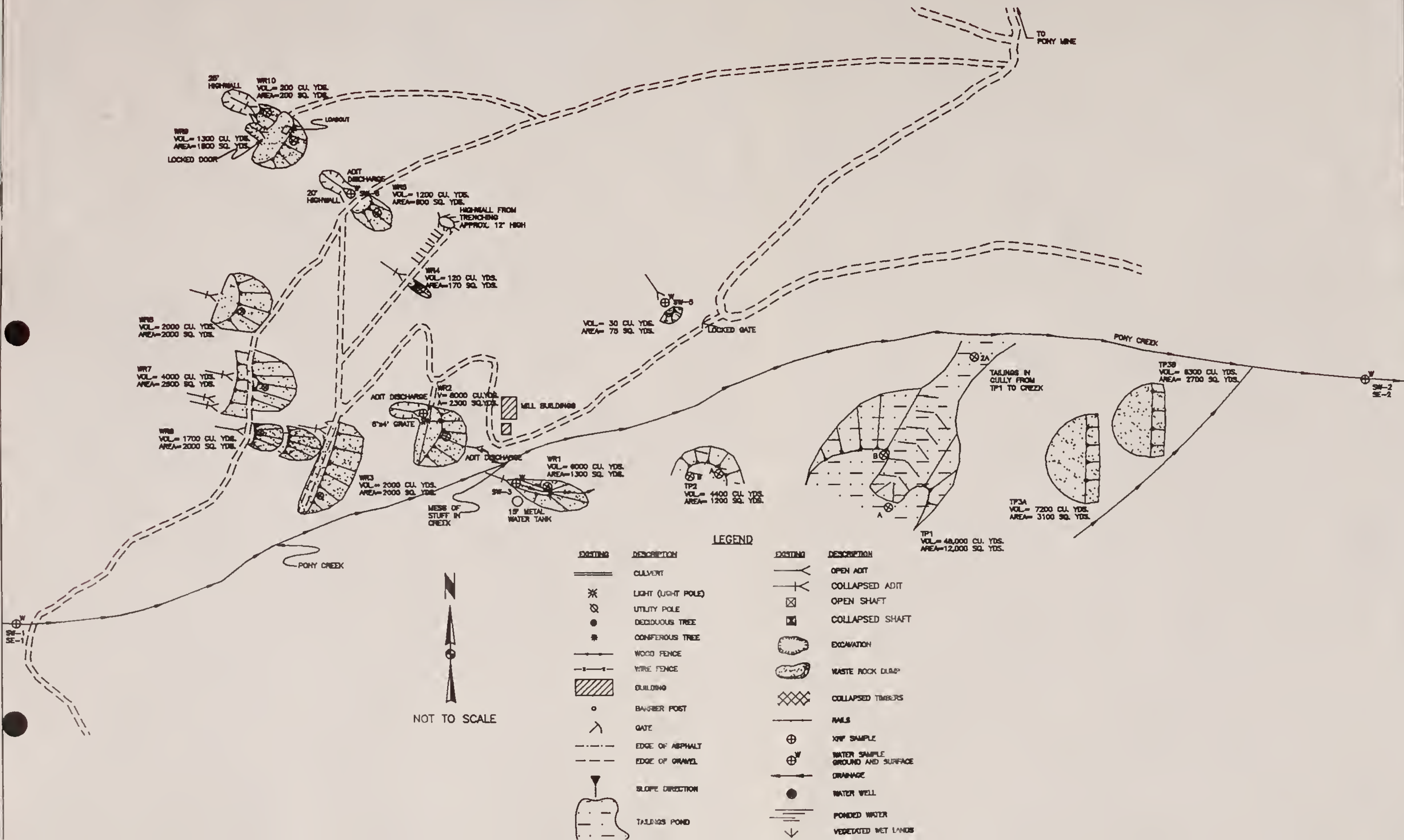


PIONEER
TECHNICAL SERVICES, INC.

BOSS TWEED, P.A. NO. 29-034

T02S, R03W, SECTION 15

SCALE: 1" = 1000'



DRAWN JTP DATE 29 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TDH
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BOSS TWEED PA# 29-034
PONY DISTRICT MADISON COUNTY

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Grades from fine sand to clay

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): TP-1 deepest depth is 70 feet; TP-2 deepest depth is 12 feet; TP-3 deepest depth is 7 feet. On TP-1, the upper 20 feet appears to be oxidized zone, lower than that is clay. All of TP-2 appears to be brown sand, reached orange sand/clay just before reaching underlying soil.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry to wet in TP-1 (gray clay is wet); TP-2 is dry to damp.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): TP-1 (pile) no impoundment; TP-2 (pile) no impoundment; TP-3 both berms breached.

Comments on potential for mitigation: Bank away from Pony Creek; berm between creek an TP-1 and -2 to prevent erosion into creek; recontour TP-1 to aid in revegetation process.

SOURCE INVENTORY FORM

SAMPLERS: M. Babits, S. Babits, Flammang*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	48,000	Large pile east of mine, on east side of gully; 0-7', brown sands	None	5.8 (D)	0.06	29-034-TP-1	09/15/93 1330	T-Metals, ABA
TP-1A-B	TAIL		7-10', tan sands/clay	None	5.2 (D)	0.045			
TP-1A-C	TAIL		10-13', tan clay/sand	None	5.4 (D)	0.05			
TP-1A-D	TAIL		20-35', gray clay	None	6.4 (D)	0.04	29-034-TP-2	09/15/93 1345	T-Metals, ABA, CN-
TP-1A-E	TAIL		35-50', gray clay	None	6.35 (D)	0.045			
TP-1A-F	TAIL		50-70', brown sand (sluff)	None	6.2 (D)	0.06			
TP-1B-A	TAIL		Large pile east of mine, on west end of gully	None	6.0 (D)	0.03			
TP-1B-B	TAIL			None	5.5 (D)	0.03			
TP-1B-C	TAIL			None	5.5 (D)	0.05			
TP-1B-D	TAIL			None	5.0 (D)	0.04			
TP-1B-E	TAIL			None	6.6 (D)	0.02			
TP-2A	TAIL		Grab at creek by TP-1	None	3.5 (D)	0.04			
TP-2A-A	TAIL	4,400	East of WR-1, east end; 0-7.5', brown sand	None	6.8 (D)	0.05	29-034-TP-3	09/16/93 0837	T-Metals, ABA
TP-2A-B	TAIL		7.5-11', brown sand	None	5.6 (D)	0.05			
TP-2A-C	TAIL		11-12', red brown sand	None	5.2 (D)	0.05			
TP-2A-D	TAIL		Underlying soil	None	5.8 (D)	0.04			
TP-2B-A	TAIL		Pond 200' below WR-1, west side; 0-6', brown sand	None	6.7 (D)	0.04			
TP-2B-B	TAIL		6-8', brown sandy clay	None	6.4 (D)	0.04			
TP-2B-C	TAIL		8-10', brown orange sand	None	6.4 (D)	0.05			

D-Direct reading (Kelway Meter); S-Saturated Paste (Orion Meter)

Comments or deviations from SOPs: 29-034-TP-1 is composite of TP-1A-A through -1A-C and 1A-F, and TP-1B-A through -1B-C, and TP-2A. 29-034-TP-2 is composite of TP-1A-D and -1A-E, and TP-1B-D and -1B-E. 29-034-TP-3 is composite of TP-2A-A through -2A-C, and TP-2B-A through -2B-C.

*Continued on next page

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: M. Babits, S. Babits, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-3A-A	TAIL	7,200	Pond below TP-1; 0-3', brown-rusty sand	None	5.8 (D)	0.03	29-034-TP-4	09/16/93 0845	T-Metals, ABA, CN-
TP-3A-B	TAIL		3-4', iron-stained clay	None	5.0 (D)	0.03			
TP-3A-C	TAIL		4-7', gray soft clay	None	3.8 (D)	0.06			
TP-3A-D	TAIL		7-7.5', underlying soil	None	3.5 (D)	0.04	29-034-TP-5	09/16/93 0835	T-Metals, ABA
TP-3B-A	TAIL	6,300	Lowest pond; 0-5'	None	4.8 (D)	0.04			
TP-3B-B	TAIL		5-7'	None	5.8 (D)	0.05			
TP-3B-C	TAIL		Underlying soil	None	6.0 (D)	0.06			
WR-1	WR	6,000	Below steel building, northeast corner	None	5.3 (D)	0.04	29-034-WR-1	09/15/93 2040	T-Metals, ABA
WR-2	WR	8,000	South of steel building, northeast edge	None	6.1 (D)	0.04			
WR-3	WR	2,000	South and above WR-2, south end	None	6.8 (D)	0.06			
WR-4	WR	120	Old dump in road from WR-2, off knob just below heavily vegetated area	None	6.8 (D)	0.05	29-034-WR-2	09/15/93 2047	T-Metals, ABA
WR-5	WR	1,200	Northwest of WR-4, off knob on east side	None	6.8 (D)	0.04			
WR-6	WR	1,700	East of Adit DA, 25' off knob	None	7.0 (D)	0.065			
WR-7	WR	4,000	Northwest of WR-6, off knob below road	None	6.95 (D)	0.055			
WR-8	WR	2,000	North of WR-7, above road on southwest end of pile	None	6.8 (D)	0.06			
WR-9A	WR	8,000	North of loadout and adit	None	6.0 (D)	0.04	29-034-WR-3	09/15/93 2054	T-Metals, ABA
WR-9B	WR		South of loadout and adit	None	6.0 (D)	0.04			
WR-10	WR	200	Above collapsed Adit CA, east side of highwall	None	6.8 (D)	0.06			
LP-1	OTH	N/A	Small leach pond by WR-2	None	NM	NM	29-034-LP-1	09/15/93 1805	CN-

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-034-TP-4 is composite of TP-3A-A through -3A-C, and TP-3B-A and -3B-B. 29-034-TP-5 is composite of TP-3A-D and TP-3B-C. 29-034-WR-1 is composite of WR-1 through -3. 29-034-WR-2 is composite of WR-4 through -8. 29-034-WR-3 is composite of WR-9A and -9B and WR-10. See Strawberry (29-038-SS-1) for background sample. NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No ___, Number: 4 Identification: WR-1, WR-2, WR-5, Adit AA

Filled shafts: Yes ___, No X , Number: ____ Identification: ____

Seeps/Springs: Yes ___, No X , Number: ____ Identification: ____

Groundwater wells within 4 miles?: Yes X , No ___;
Number of well logs: 88

Distance to nearest well used for drinking? 1 mile

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Very large uncontained source; groundwater discharging from adit, s groundwater is in contact with metal bearing rocks. TP-1 is in drainage and very wet (in contact with groundwater). Metal values in tailings and majority of waste rock elevated only slightly above expected background.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Adit at WR-1	10 gpm (E)	7.77	262	470	6.6	37	N/A	29-034-SW-3	09/14/93 1615	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-4	AD	Adit at WR-2	< 1 gpm (E)	7.98	253	NM	5.1	NM	N/A	N/A	N/A	Field Parameters
SW-5	AD	Adit AA (dump not sampled)	< 1 gpm (E)	7.82	271	NM	5.7	NM	N/A	N/A	N/A	Field Parameters
SW-6	AD	Adit at WR-5	< 1 gpm (E)	8.77	182	NM	3.2	NM	N/A	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ____, Name(s): Pony Creek and Unnamed tributary to Pony Creek

Dry streambeds: Yes ____, No X, Name(s): ____

Other surface water: Yes X, No ____, Name(s)/Description: Four discharging adits

Waste materials within any floodplain: Yes X, No ____ Source ID(s): TP-1, TP-2, TP-3

Approximate Flood frequency? X 1 yr, ____ 10 yr, ____ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.4 cfs
High Flow: 5 cfs, Average Flow: 0.6 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X, No ____,
Describe: Adit at WR-1 flows over WR-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetland, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ____, Distance downstream (ft)? 5280 Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Sediment is in creek (tailings).

SURFACE WATER INVENTORY FORM

SAMPLERS: M. Babits/ S. Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	500 feet upgradient from WR-6 in Pony Creek	9.71	158	127	3.0	45	0.5 gpm (E)	29-034-SW-1	09/15/93 0925	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	500 feet upgradient from WR-6 in Pony Creek.	N/A	N/A	N/A	N/A	N/A	N/A	29-034-SE-1	09/15/93 0925	T-Metals
SW-2	SW	Downgradient of TP-3 prior to confluence with tributary.	8.01	233	137	9.2	35	0.4 cfs (M)	29-034-SW-2	09/15/93 1630	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Downgradient of TP-3 prior to confluence with tributary.	N/A	N/A	N/A	N/A	N/A	N/A	29-034-SE-2	09/15/93 1630	T-Metals
SW-7	BLANK	QA/QC Blank	N/A	N/A	N/A	N/A	N/A	N/A	29-034-SW-4	09/15/93 1700	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Downgradient sediment sample will be upgradient sediment sample from Strawberry Mine (29-038).

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 10 acres

Wetlands present: Yes X, No ___, Describe: Streamside and marsh

Carbonate rocks/soils: Yes ___, No X, Describe: ___

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ___; 10-30 ___; 30-100 ___; 100-300 X; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments ___

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: M. Babits, S. Babits, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3	Partial	11,700	11,700	Yes	Low
WR-2	None	Dry	20,700	20,700	Yes	Low
WR-3	None	Dry	18,000	18,000	Yes	Low
WR-4	None	Dry	1,530	918	Yes	Low
WR-5	None	Dry	7,200	7,200	Yes	Low
WR-9	None	Dry	18,000	12,600	No	None
WR-7	None	Dry	22,500	20,250	Yes	Low (hardpack)
WR-8	None	Dry	18,000	16,200	Yes	Low
WR-9	None	Dry	16,200	16,200	Yes	Low
WR-10	None	Dry	1,800	1,620	Yes	Low
TP-1	None	Partial	108,000	75,600	Yes	Observed
TP-2	None	Dry	10,800	7,560	Yes	Moderate
TP-3	pH	Dry	52,200	10,440	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes ___, No X,
Describe: ___

Population within 1 mile: 1-10___; 10-30 X; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments ___

Evidence of recreational use on site: Yes___, No X, Describe: ___

Accessibility - Fences, warning signs, closed roads? Unrestricted; a gate exists but can access alternatively.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X, Comment ___
Wilderness Area - Yes___, No X, Comment ___
T&E Species Habitat - Yes___, No X, Comment ___
Bat Habitat - Yes X, No___, Comment Open adits

Primary Drainage X; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium X, Low___
Wetlands Frontage - High___, Medium X, Low___
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No___, Number 5, types and locations: Adits at WR-1, -2, -5, -7, and -9.

Hazardous structures: Yes X, No___, Number 1, types and locations: Loadout on WR-9

Unstable highwalls, pits, trenches, slopes: Yes X, No___, Number 3, types and locations: Highwalls at Adit-BA associated with WR-5 (20' high), Adit-CA associated with WR-9 (25' high), and Adit associated with WR-10 (25' high).

Unstable waste piles, impoundments, undercut banks: Yes X, No___, Number 3, types and locations: WR-1 is oversteepened on north side; WR-2 is steep and unvegetated. TP-1 has a gully down the middle with oversteepened sides.

Fire and/or Explosion hazards: Yes___, No X, Explain: ___

Bibliography

MBMG, Well Log Database, September 8, 1993.

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LABORATORY ANALYTICAL DATA

BOSS TWEED
PA NO. 29-034

Boss Tweed PA# 29−034
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 09/14/93
Page 1 of 2.

SOLID MATRIX ANALYSES

Metals in soils   Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29−034−SE−1	17.7 J	55.6	1.3 U	7.71	21.8	13.5	14700	0.034 UJ	486	12.7	9.34 U	9.01 UJ	44.7	NR
29−034−SE−2	8.05 J	27	2.2	4.72	5.5	93.6	12400	0.087 J	619	6.21	34.4	7.39 UJ	206	NR
29−034−TP−1	11 J	55.7	2.3	5.62	28.4	95	24000	0.085 J	1290	15.4	91.7	8 UJ	279	NR
29−034−TP−2	17.3 J	36	8.3	9.49	5.91	164	24500	0.468 J	745	8.58	327	8.42 UJ	1030	0.353
29−034−TP−3	8.96 J	15.8	5.0	6.49	7.25	354	20500	0.971 J	681	6.63	148	6.86 UJ	389	NR
29−034−TP−4	7.31 J	45.9	9.0	9.88	6.24	518	27600	3.53 J	1060	11	326	7.29 UJ	849	0.646
29−034−TP−5	4.45 U	103	2.7	7.05	13.4	32.6	14800	0.109 J	527	9.81	31.8	5.89 UJ	593	NR
29−034−WR−1	20.4 J	133	5.6	16.3	14.3	195	27900	1.16 J	2340	16.9	138	4.3 UJ	373	NR
29−034−WR−2	13.6 J	237	13.3	11.4	5.43	154	31500	0.838 J	2990	11.6	139	5.26 UJ	842	NR
29−034−WR−3	37.9 J	112	2.3	6.48	9.78	146	29200	0.26 J	439	6.26	1870	5.49 UJ	99.8	NR
29−034−LP−1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.394
BACKGROUND	20.1 J	168	0.8 U	10.7	31.5	29.2	21300	0.036 UJ	596	22	15.9	5.47 UJ	74.9	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29−034−TP−1	0.23	7.19	67.3	60.1	0.05	0.12	0.06	3.75	63.6
29−034−TP−2	1.11	34.7	29.2	−5.4	0.2	0.84	0.07	26.2	2.98
29−034−TP−3	0.92	28.7	27.8	−0.9	0.33	0.48	0.11	15	12.8
29−034−TP−4	1.03	32.2	34.1	1.96	0.3	0.61	0.12	19.1	15.1
29−034−TP−5	0.09	2.81	7.05	4.23	0.04	0.01	0.04	0.31	6.73
29−034−WR−1	1.17	36.6	64.5	27.9	<0.01	0.86	0.51	26.9	37.6
29−034−WR−2	0.28	8.75	39.6	30.9	0.12	<0.01	0.17	0	39.6
29−034−WR−3	0.58	18.1	2.05	−16.	0.57	0.01	<0.01	0.31	1.74
29−034−WR−3	0.56	17.5	2.45	−15	0.55	0.01	<0.01	0.31	2.13

Boss Tweed PA# 29−034
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 09/14/93
Page 2 of 2.

WATER MATRIX ANALYSES

Metals in Water Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29−034−SW−1	7.82	15.5	4.59 U	5 U	6.24 U	2.33 U	576	0.12 J	28.1	10.9 U	4.99	31.7 U	8.71 U	47.3
29−034−SW−2	1.12 U	13.7	4.59 U	5 U	6.24 U	2.57	195	0.12 U	19.3	10.9 U	3.55	31.7 U	8.71 U	93.7
29−034−SW−3	4.1	3.23	4.59 U	5 U	6.24 U	12	235	0.13 J	394	10.9 U	1.37	31.7 U	250	139
29−034−SW−4	1.41	1.1 U	4.59 U	5 U	6.24 U	2.33 U	13.7 U	0.12 U	3.76 U	10.9 U	1.25	31.7 U	8.71 U	0.1

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
29−034−SW−1	96	< 5	< 5	0.1	NR
29−034−SW−2	160	< 5	49	0.44	< 0.00
29−034−SW−3	217	< 5	89	0.58	NR
29−034−SW−4	NR	NR	NR	NR	< 0.00

LEGEND

SE1 − 500 feet upgradient from waste rock dump 6 in Pony Creek.
SE2 − Downgradient of TP3 prior to confluence with tributary.
TP1 − Composite of subsamples TP1A−A through 1A−F, 1B−A through 1B−C, and 2A.
TP2 − Composite of subsamples TP1A−D, 1A−E, 1B−D, and 1B−E.
TP3 − Composite of subsamples TP2A−A, 2A−B, 2A−C, 2B−A, 2B−B and 2B−C.
TP4 − Composite of subsamples TP3B−A, 3B−B, 3A−A, 3A−B, and 3A−C.
TP5 − Composite of subsamples TP3B−C and 3A−D.
WR1 − Composite of subsamples WR1, 2, and 3.
WR2 − Composite of subsamples WR4, 5, 6, 7, and 8.
LP1 − Small leach pond by WR2.
WR3 − Composite of subsamples WR9A, 9B, and 10.
BACKGROUND − From the Strawberry Mine (29−038−SS−1).
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.
SW3 − Adit discharge at WR1.
SW4 − QA/QC Blank.

XRF ANALYSIS RESULTS

BOSS TWEED
PA NO. 29-034

Mine Name: Boss Tweed PA# 29-034
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-034-TP1A-A		33409.3	18824.8	2545.85		974.122 *	20799.6			434.205	30.7178 *	69.1083
29-034-TP1A-B		34294.3	20562.8	3057.5		1084.85	23642.5		61.7795 *	344.733		63.5224
29-034-TP1A-C		47273.2	23149.2	3406.95		1402.76	25486.5			435.323	40.3665 *	77.4117
29-034-TP1A-D		29006.8	7073.7	1935.46		1029.38	16727		98.1056 *	864.993		27.2625
29-034-TP1A-E		35387.2	6084.48	2198.3		678.612 *	20630.8		107.244 *	781.73		25.3705
29-034-TP1A-F		35953.3	19262.5	2793.23		1801.75	19848.6		89.9566 *	418.961		59.5091
29-034-TP1B-A		39446.7	29870.8	3231.61		1779.94	26472.7			201.525		69.8208
29-034-TP1B-B		33586.7	17913.9	2459.83		1287.21	24973.2			167.806		67.4042
29-034-TP1B-C		55933.2	23917	3373.27		1676.28	28124.8		63.6282 *	393.055		60.6093
29-034-TP1B-D		51972.5	7834.23	3158.38		620.178 *	32718.7	281.827 *	123.877 *	610.914		23.0742
29-034-TP1B-E		35741.8	9696.94	2067.09		850.653 *	17494.3					11.9961 *
29-034-TP2A-A		40435.7	15281.6	2519.51		936.119 *	21128		267.856	365.089		69.3441
29-034-TP2A-B		48614.9	13853.3	2914.61		1207.34	22152.3		249.822	347.619		50.5303
29-034-TP2A-C		37215.3	5645.91	2430.49		690.984 *	21701.5		601.865	276.271	38.4943 *	33.1423
29-034-TP2A-D		24249.6	13535	2767.3		1166.37	30182.4		864.363	284.609		124.958
29-034-TP2B-A		37031.5	11806.3	2667.69		1141.3	21455.1		210.117	407.065		56.655
29-034-TP2B-B		44975.4	9313.01	3773.92		2142.91	37004.1		761.1	597.644		46.5254
29-034-TP2B-C		46373.2	1599.94	3365.52		371.084 *	30004.4		238.459	163.413		30.3204
29-034-TP2-A		34690.7	21175.1	2806.15		1561.85	19753.4		88.1488 *	385.925		67.1386
29-034-TP3A-A		46002.1	19268	3372.29		1547.04	32729		319.713	528.712		63.0712
29-034-TP3A-B		44833.8	4090.77	3150.86			42475.1		977.409	307.53		
29-034-TP3A-C		28240	11442.3	1956.35	192.452 *	1084.5	22852.4		184.436	192.498		45.0964
29-034-TP3A-D		20320.1	12084.3	2827.58		920.293 *	29040.5			101.1 *		135.952
29-034-TP3B-A		35552.2	8911.95	2171.89		873.831 *	14378.3		86.532 *	328.778		44.1608
29-034-TP3B-B		56685.4	12956.5	3781.63		1267.67	30382.4		599.568	1502.77		52.9673
29-034-TP3B-C		24488.5	10066	2469.45		750.51 *	23230.8		40.5136 *	847.324	30.2938 *	95.3414
29-034-TP-1-COMP		42723.4	22392.1	3139.42		1958.79	25616.1		116.507 *	389.167		63.0178
29-034-TP-2-COMP		35478.8	7995.89	2363.5		981.418	21061.3		126.7 *	727.656		29.9786
29-034-TP-3-COMP		36848.8	13955.9	2874.2		815.419 *	23271.2		194.454	405.651		51.8639
29-034-TP-4-COMP		52770.4	14358.6	3441.72		991.835 *	31218		353.235	713.911		50.8847
29-034-TP-5-COMP		22095.1	11804.2	2732.46		968.913 *	26476.6			502.654		120.386
29-034-WR9-A		37841.7	12331	2241.4			61174.3		139.351 *	114.93 *		50.3761
29-034-WR9-B		19202.6	8610.53	3181.66		1410.61	45993.8		126.755 *	209.592		106.627
29-034-WR-1		39488.5	32998.3	2809.12		1555.54	28503.4		509.444	345.585		53.5587
29-034-WR-10		27241.4	6251.82	3213.88		2487.39	47591.6		161.588 *	142.566		75.0454
29-034-WR-1-COMP		28181.8	28105.7	2882.86		2044.09	34371		163.303	372.524		64.2171
29-034-WR-2		23315.1	26471.9	4471.67		2016.43	51405.3		105.871 *	297.319		143.984
29-034-WR-2-COMP		36481.6	14522.9	3629.14		3753.09	65022.9		110.877 *	711.678		62.2165
29-034-WR-3		37915.2	29124.9	3438.97		5463.93	44661.3		101.216 *	640.361	61.3265 *	89.0176
29-034-WR-3-COMP		25690.3	8266.16	2335.94		1116.28	47255.2		167.031 *	157.223		61.3662
29-034-WR-4		17787.4	13724.1	3443.41		754.68 *	38301.7		62.0728 *	145.802	31.8224 *	123.685
29-034-WR-5		29029.3	17421.8	3079.44		1656.06	56172.1		143.308 *	579.932	63.9206 *	73.3171
29-034-WR-6		31533.7	4881.36	2475.46		2653.61	62392.1		219.618	668.531		43.5472
29-034-WR-7		30175.8	27457	3596.52		7668.94	45265.8		56.8151 *	323.078	39.9324 *	79.8088
29-034-WR-8		45227.4	5206.2	4105.78		2408.73	73669		116.987 *	1083.53	98.3064 *	57.8407

Mine Name: Boss Tweed PA# 29-034
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-034-TP1A-A	300.665			47.9168 *	159.848	130.31 *		673.862		15.8202 *	17.9289 *
29-034-TP1A-B	363.037			88.5479	174.378			688.55		13.2146 *	21.8898
29-034-TP1A-C	351.287			43.2159 *	230.113			769.779		16.7526 *	23.9394
29-034-TP1A-D	307.254			186.961	177.777			396.819			34.6597
29-034-TP1A-E	380.095			220.844	188.001			320.788		12.5701 *	32.7555
29-034-TP1A-F	374.74			63.5172	186.181			636.723	89.0249 *		24.7676
29-034-TP1B-A	392.288			53.4433 *	193.282			605.867	91.0628 *	16.2169 *	22.5703
29-034-TP1B-B	323.497			68.733	216.509			676.36	96.2617 *	20.1014 *	21.03 *
29-034-TP1B-C	256.218			131.593	248.591			570.022		22.1081 *	27.5702
29-034-TP1B-D	354.76			299.718	270.73			425.967		17.1246 *	29.1517
29-034-TP1B-E	265.049			124.767	179.725			511.523		16.4039 *	22.2039
29-034-TP2A-A	243.316			98.888	194.69			743.022		12.4503 *	18.2762 *
29-034-TP2A-B	207.057			117.273	203.95			675.286	124.429 *	13.7271 *	25.0182
29-034-TP2A-C	175.525			89.7559	171.376			577.207		16.233 *	21.4817
29-034-TP2A-D	228.071			62.5381 *	133.69			377.231		11.1426 *	12.4756 *
29-034-TP2B-A	254.412			92.0879	178.625			669.912		10.6977 *	18.8715 *
29-034-TP2B-B	265.401			197.97	203.266			686.195		11.2147 *	18.4708 *
29-034-TP2B-C	244.501		4.51008 *	187.943	222.445			615.522			20.3432 *
29-034-TP2-A	638.667			65.4126 *	176.455			645.018	121.161 *	12.8889 *	30.3612
29-034-TP3A-A	262.505			211.595	256.825			728.19		19.4534 *	21.8214 *
29-034-TP3A-B											
29-034-TP3A-C	161.36			149.575	231.78	214.405 *		476.009		18.4156 *	28.5811
29-034-TP3A-D	384.078			18.8835 *	169.324			926.497		16.6574 *	22.5508
29-034-TP3B-A	181.639			86.4551	163.605			679.803	97.5505 *	11.7205 *	25.6961
29-034-TP3B-B	271.289			313.144	282.226			633.59		20.6132 *	21.9701 *
29-034-TP3B-C	272.893			23.5566 *	182.623			776.96			22.6527
29-034-TP-1-COMP	367.189			101.171	206.701			637.989	93.5417 *	16.0294 *	22.2602
29-034-TP-2-COMP	339.444			197.764	198.728			402.351		17.0333 *	21.6364 *
29-034-TP-3-COMP	233.782			91.7732	169.773			668.166	94.172 *	14.5396 *	21.3638
29-034-TP-4-COMP	243.218			199.193	243.753			637.224		20.673 *	25.4752
29-034-TP-5-COMP	396.012				172.273			910.259	101.005 *	22.5518 *	20.1848 *
29-034-WR9-A	571.457			1523.1	230.471	185.22 *		771.592	146.267 *	14.4375 *	24.6009 *
29-034-WR9-B	460.3			365.34	121.948			712.984	93.5272 *	13.8232 *	21.1844 *
29-034-WR-1	306.466		7.45958 *	197.552	226.904			895.112	120.493 *		28.3647
29-034-WR-10	545.643			377.468	184.313			1044.6		13.0824 *	29.3403
29-034-WR-1-COMP	279.883			87.8172	171.9			584.349		9.99689 *	19.4381 *
29-034-WR-2	343.979			115.551	140.58			672.033		10.7872 *	13.4849 *
29-034-WR-2-COMP	424.099		8.37324 *	167.409	232.642			536.656	136.68 *	11.9062 *	15.2976 *
29-034-WR-3	365.398			60.4209 *	206.644	187.433 *		885.139	109.147 *	17.7131 *	23.4422
29-034-WR-3-COMP	459.792			948.516	169.658			693.601		16.0606 *	21.9494 *
29-034-WR-4	400.834				114.981			887.071	99.5634 *	12.3394 *	20.3316
29-034-WR-5	407.793			98.1427	193.668			840.951		19.3428 *	25.5409
29-034-WR-6	200.104		12.0352 *	401.327	203.708			503.852	138.747 *	16.1267 *	17.4792 *
29-034-WR-7	406.891		9.24964 *	47.9575 *	209.833			639.801		15.0021 *	20.6858
29-034-WR-8	455.572		8.79138 *	164.436	302.432			427.72			19.2669 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BOSS TWEED
PA NO. 29-034

AIMSS SCORESHEET

SITE NAME: BOSS TWEED
PA NUMBER: 29-034

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	11.192
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		87
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	89.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	400674
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	12.606
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		5
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	23
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	202957
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.286
29	AIR - TARGETS	POPULATION - 4 MILES		100
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	110
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1573
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.256
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	10
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	128
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**6.05**

SITE NAME: BOSS TWEED
PA NUMBER: 29-034

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	250
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	225
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	515
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	10
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**51.50**

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: STRAWBERRY MINE PA#: 29-038

Date: September 14, 1993 Time: 0815

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
S. Babits, Pioneer

Visitors: None

Weather/Seasonality Observations: Cloudy; cool (30°F-45°F); slight breeze; cool, wet spring and summer; snow present now in shade.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): Photos taken were misplaced. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Adit discharge has neutral pH, but exceeds Maximum Contaminant Levels for Cd and should be treated. Tailings could be revegetated although some Hg is present. Revegetate waste rock after recontouring.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): STRAWBERRY MINE PA#: 29-038

Legal Description: T 2S ;R 3W ;Sec. 14 , N 1/2 NE1/4 1/4

County: MADISON Mining District: PONY

Latitude: N 45° 39' 50" Longitude: W 111° 55' 50"

Primary Drainage Basin and Code: North Willow Creek/10020005
Secondary Drainage Basin: Pony Creek

USGS Quadrangle map name(s): Pony

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Easton Pacific and Riverside Mining, P.O. Box 1011, St. Cloud, MN 56301; Dick Fischer, East Pacific Mines, Inc., 6183 S. Willowbrook Drive, Morrison, CO 80465; Taylor Revocable Family Trust, c/o George and Gwenn Taylor, P.O. Box 6383, Los Osos, CA 93412. (805) 528-2910.

Relationship to other mines/sites in the area/district: Numerous prospects in the area. The Boss Tweed is one mile to the west up Pony Creek.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6400'-7000' , Slope 25°
Aspect Southeast

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural X , Other(Specify)___

Area of disturbed/unvegetated lands? Approx. 3 acres.
Dimensions:___

Predominant vegetation types: Sage, bunch grass, pines

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by gneiss. Majority of adits of Strawberry Mine are located on north side of Pony Creek. The mill and tailings ponds and one adit lie directly in the Pony Creek drainage. Pony Creek flows southeast past of the site. Only the adit closest to the stream is discharging and the one just above the stream has standing water.

Mining/milling history, ore type/tenor, host rock, gangue: The site was first discovered in 1875 and operated from 1900 to approx. 1925; idle in 1934. Host rock is gneiss; ore occurs in quartz veins in fissures, where productive vein is strongly mineralized with iron sulfides (auriferous pyrite).

Mine Operation?
Shafts - Yes X , No ___, # 4 , Comment All open
Adits - Yes X , No ___, # 12 , Comment 10 open; 2 collapsed
Pits - Yes ___, No X , # ___, Comment
Placers - Yes ___, No X , # ___, Comment
Other - Yes ___, No X , # ___, Comment

Mill Operation? Yes X , No ___. If yes answer the next three questions:

Period(s) of Operation: 1900 to 1950's. Soon after 1875, a 12-stamp mill was in operation.

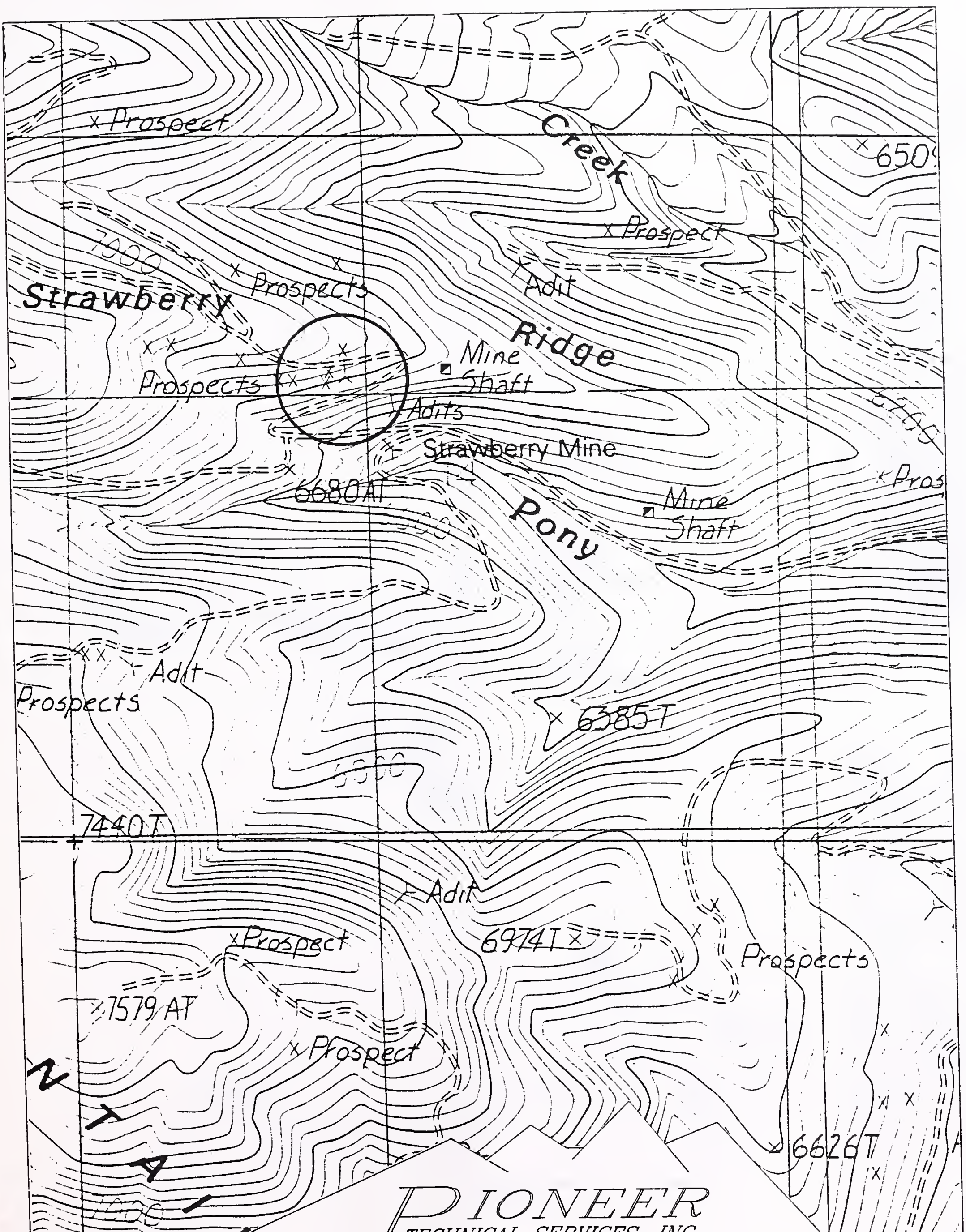
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: Bozeman Mine, Old Joe Mine, and Strawberry Mine

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Mine was dumped on 2-inch grizzly; oversize went to jaw crusher. Ore was fed from bin to ten 900-pound stamps. Stamps discharge through 24 mesh screens to two 4' x 8' amalgam plates, then to a Denver amalgamator and to a Denver sub-A flotation cell; amyl xanthate and aerofloat were added to the cell. Recovery was 81%; mill capacity was about 1 1/2 tons/hr. The mill was used for tungsten ore in the 1950's.

Montana Bureau of Mines and Geology
Water Well Log Data

11/15/1993

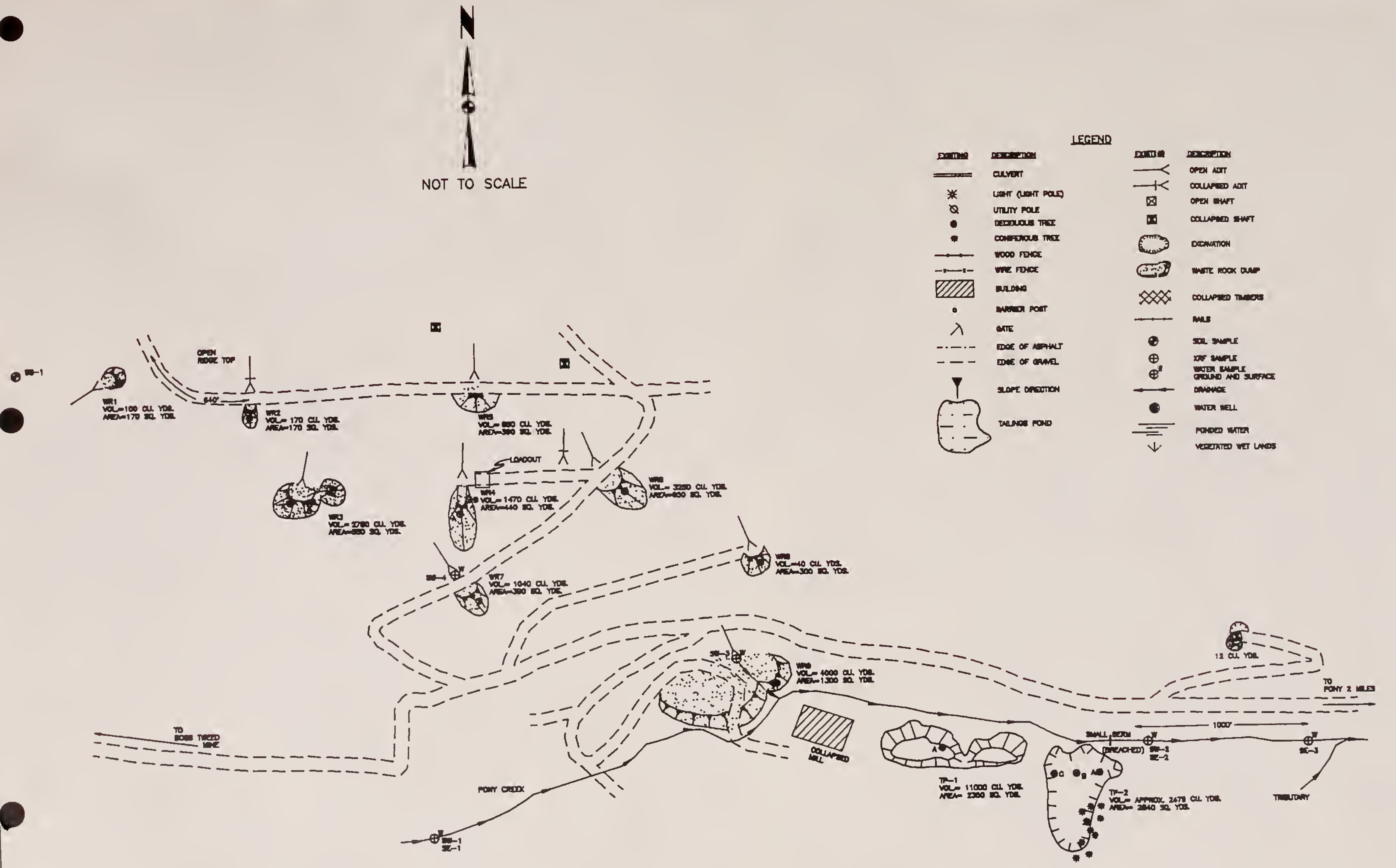
Well No.	Location	Depth	Yield	Static Water Level
M:107280	02S 03W 13 DDD	340.0	15.0	23.00
M:122566	02S 03W 24	120.0	9.0	50.00



PIONEER
TECHNICAL SERVICES, INC.

STRAWBERRY, P.A. NO. 29-038

T02S, R03W, SECTION 14
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

STRAWBERRY PA# 29-038
PONY DISTRICT MADISON COUNTY

PIONEER TECHNICAL SERVICES, INC.

DRAWN JTP DATE 18 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

TD&H
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

29-038.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Sand to sandy clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): TP-1 deepest depth is 14' with medium brown, tan sand, medium brown sand with clay lenses and medium orange sand. TP-2 depth ranges from 8" to 5' with medium light to dark orange sand, white clayey sand to white sand with orange sandy lenses or gray clay; orangish sand is always present within the first 2'.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Tailings near stream are wet; those above are dry.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): TP-2 dam is breached as is TP-1.

Comments on potential for mitigation: Areas with shallow depths of tailings appear to be revegetating naturally, anything less than a foot is revegetated. Isolate TP-1 from stream.

SOURCE INVENTORY FORM

SAMPLERS: M. Babits, Flammang*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	100	East end of knob; approx. 30′ from Adit W	None	6.9 (D)	0.06	29-038-WR-1	09/14/93 1650	T-Metals, ABA
WR-2	WR	170	640′ from collapsed Adit W on north side of road; south side of road	None	6.9 (D)	0.05			
WR-3A	WR	2,750	West side of WR-3, southwest of X-1; approx. 10′ from top	None	6.9 (D)	0.05			
WR-3B	WR		East side of WR-3, southwest of shaft; 15′ from top	None	6.75 (D)	0.055			
WR-4A	WR	1,470	West end of knob; approx. 5 feet from top	None	6.8 (D)	0.04	29-038-WR-2	09/14/93 1700	T-Metals, ABA
WR-4B	WR		East side of dump; 30′ west of loadout	None	6.95 (D)	0.06			
WR-6	WR	3,250	In middle of WR-6; approx. 10′ off top slightly west and south of Adit 6	None	6.9 (D)	0.05			
WR-7	WR	1,040	East of Adit Y, southeast of cabin; approx. 30 feet	None	5.35 (D)	0.04			
WR-8	WR	40	East of Adit Z; approx. 10′ from top	None	6.6 (D)	0.03			
WR-9	WR	4,000	Adjacent to Pony Creek	None	3.6 (D)	0.05			
SS-1	BKGRND	N/A	Background soil approx. 500′ from Adit W	N/A	6.95 (D)	0.03	29-038-SS-1	09/14/93 0835	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-038-WR-1 is composite of WR-1 through WR-3B. 29-038-WR-2 is composite of WR-4A and -4B, and WR-6 through WR-9.

*Continued on next page

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: M. Babits, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	11,000	East end of pile, below mill building; 0-2', medium brown sand	None	6.4 (D)	0.03	29-038-TP-1	09/14/93 1010	T-Metals, ABA
TP-1A-B	TAIL		2-4', medium tan sand	None	6.4 (D)	0.03			
TP-1A-C	TAIL		4-6', medium brown sand with clay lenses	None	4.4 (D)	0.05	29-038-TP-2	09/14/93 1010	T-Metals, ABA, CN-
TP-1A-D	TAIL		6-10', medium orange sand	None	<3.5 (D)	0.04			
TP-1A-E	TAIL		10-14', medium orange sand	None	5.2 (D)	0.03			
TP-2A-A	TAIL	2,475	Approx. 25' west of stream, 10' upgradient of TP-2 berm; 0-2', medium light orange to dark orange	Breached Dam	<3.5 (D)	0.05			
TP-2A-B	TAIL		2-3', gray clay	Breached Dam	6.8 (D)	0.03			
TP-2B-A	TAIL		Approx. 125' from TP-2 berm upgradient in lowest unvegetated deposit; 0-2', orange to brown sand	Breached Dam	4.0 (D)	0.05			
TP-2B-B	TAIL		2-4', white clay sand to white sand with orange sandy lenses	Breached Dam	< 3.5 (D)	0.05			
TP-2B-C	TAIL		4-5', mixed	Breached Dam	4.0 (D)	0.05			
TP-2B-D	TAIL		Natural brown silt underlying TP-2B	Breached Dam	6.4 (D)	0.04			
TP-2C-A	TAIL		Just below tailings pushed into road below TP-1B; 0-2', brown and orange sand	Breached Dam	6.0 (D)	0.06			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-038-TP-1 is composite of TP-1A-A and -1A-B, TP-2A-A and -2A-B, TP-2B-A and -2B-B, and TP-2C-A. 29-038-TP-2 is composite of TP-1A-C through -1A-E, and TP-2B-C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes_X_, No___, Number:_1_ Identification:_Adit at WR-9 was discharging; Adit at WR-7 contained standing water._

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_92___

Distance to nearest well used for drinking?_Approx. 1.5 miles_

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X_, Unlikely____.
Groundwater is in contact with possible mineralized stone in Adit T however, dump values indicate metal values are only slightly elevated.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: M. Babits, S. Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Adit at WR-9	0.02 cfs (E)	7.0	290	96	9.3	83	N/A	29-038-SW-3	09/14/93 1400	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-4	AD	Adit at WR-7	N/A	8.61	218	218	7.7	NM	N/A	N/A	N/A	Field Parameters

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Pony Creek

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes X, No ___, Name(s)/Description: Discharge from Adit at WR-9

Waste materials within any floodplain: Yes X, No ___ Source ID(s): TP-1, TP-2, and WR-9 are in floodplain of Pony Creek.

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.12 cfs
High Flow: 1.0 cfs, Average Flow: 0.15 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between TP-1 and TP-2 as lay in valley

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Discharge from Adit at WR-9

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, Agriculture, wetlands

Observed erosional/sedimentation/stream turbidity problems? Yes X, No ___, Distance downstream (ft)? 1000+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Tailings are present in sediments.

SURFACE WATER INVENTORY FORM

SAMPLERS: S. Babits/M. Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	250' upstream of mine access road Pony Creek crossing (upgradient)	8.3	186	140	7.8	55	0.12 cfs (M)	29-038-SW-1	09/14/93 1415	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	250' upstream of mine access road Pony Creek crossing (sediment sample)	N/A	N/A	N/A	N/A	N/A	N/A	29-038-SE-1	09/14/93 1315	T-Metals
SW-2	SW	1,200' downstream of mill ruins, below last tailings (down gradient)	7.1	189	153	9.4	48	0.08 cfs (E)	29-038-SW-2	09/14/93 1315	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	1,200' downstream of mill ruins, below last tailings (sediment sample)	N/A	N/A	N/A	N/A	N/A	N/A	29-038-SE-2	09/14/93 1315	T-Metals
SE-3	SE	1,000' downgradient of SE-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 0

Wetlands present: Yes_X_, No___, Describe: Streamside

Carbonate rocks/soils: Yes___, No_X_, Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1.5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: M. Babits, S. Babits, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	1,530	383	No	None
WR-2	None	Dry	1,530	1,224	Yes	Low
WR-3	None	Dry	4,950	4,703	Yes	Low
WR-4	None	Dry	3,960	3,920	Yes	Moderate
WR-5	Vegetated	Dry	3,510	1,755	No	None
WR-6	SO3	Dry	5,850	5,850	Yes	Low
WR-7	SO3	Dry	3,510	3,335	Yes	Low
WR-8	None	Dry	2,700	2,430	Yes	Moderate
WR-9	SO3; pH	Dry	11,700	11,700	Yes	Low
TP-1	pH	Moist	21,150	10,575	Yes	Moderate
TP-2	pH	Partial	23,760	5,940	Yes	Moderate
Adit	FEOX; SPG	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe: Beer cans were found on Adit #1.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes___, No_X_, Comment____
Bat Habitat - Yes_X_, No___, Comment Open adits

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_14_, types and locations: Open adits: Adit W, Adit X and X2, Adit V, Adit U, Adit above WR-5, Adit Above WR-4, Adit Y, Adit Z, Adit T. Open shafts: Shaft U, Shaft W, Shaft V, and Shaft west of Adit V.

Hazardous structures: Yes_X_, No___, Number_4_, types and locations: Mill building loadout on WR-4; cabin on WR-7; headframe structure

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_, types and locations: Pit containing Adit X1 and X2.

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:____

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Mill building in particular contains lots of dry wood.

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Strawberry, Prepared by Northern Engineering and Testing, August 23, 1988.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Strawberry, Prepared by Daphne Digrindakis, July 17, 1985.

MDSL/AMRB Files, Montana Historical and Architectural Inventory Form for Strawberry Mill, Prepared by RTI, Inc., July 1985.

USBM, Gold Lode Mining in the Tobacco Root Mountains, Madison County, Montana, Information Circular 6972, Written by S.H. Lorain, November 1937, pp. 29-37.

USGS, Mining Districts of the Dillon Quadrangle, Montana, and Adjacent Areas, Bulletin 574, Written by Alexander N. Winchell, 1914, pp. 118-127.

USGS, Topographic Map, Pony, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

STRAWBERRY
PA NO. 29-038

MDSL AMRB/PIONEER 4/9/93

Strawberry PA# 29−038
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 09/14/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29−038−SE−1	11.6 J	29.6	1.5	4.04	7.65	77.7	12700	0.113 J	555	12.1	43.7	7.8 UJ	206	NR
29−038−SE−2	5.81 J	55	1.7	7.96	15.4	45.7	13200	0.063 J	470	14.1	21.9	5.95 UJ	140	NR
29−038−TP−1	23.2 J	141	1.8	11.9	40.6	294	21300	1.17 J	330	39.5	367	7.33 UJ	360	NR
29−038−TP−2	26.1 J	139	1.0 U	2.25	9.27	167	20800	1.94 J	52	4.87	584	6.71 UJ	172	1.42
29−038−WR−1	32 J	83.3	2.8	18.8	39.7	275	29500	0.218 J	478	33.4	1510	7 J	278	NR
29−038−WR−2	40.6 J	177	1.6	12.5	36.3	155	36600	0.882 J	415	36.3	266	5.01 UJ	142	NR
BACKGROUND	20.1 J	168	0.8 U	10.7	31.5	29.2	21300	0.036 UJ	596	22	15.9	5.47 UJ	74.9	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29−038−TP−1	<0.01	0	77.6	77.6	<0.01	<0.01	0.01	0	77.6
29−038−TP−2	0.34	10.6	0.34	−10.	0.33	0.01	<0.01	0.31	0.03
29−038−TP−2DUP	0.32	10	0.39	−9.6	0.31	0.01	<0.01	0.31	0.08
29−038−TP−2	0.34	10.6	0.34	−10.	0.33	0.01	<0.01	0.31	0.03
29−038−WR−1	0.07	2.19	5.38	3.19	0.05	0.01	0.01	0.31	5.06
29−038−WR−2	0.45	14.1	2.26	−11.	0.44	0.01	<0.01	0.31	1.94

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29−038−SW−1	2.82	13.1	4.59 U	5 U	6.24 U	2.33 U	66.5	0.12 U	4.6	10.9 U	1.35	31.7 U	8.71 U	75.5
29−038−SW−2	3.37	16.5	4.59 U	5 U	6.24 U	2.33 U	268	0.23 J	43	10.9 U	1.64	31.7 U	24	87.2
29−038−SW−3	4.86	38.1	12.9	36.7	6.37	77.7	12000	0.16 J	1750	81.4	1.61	31.7 U	762	276

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
29−038−SW−1	164	< 5	31	0.3	NR
29−038−SW−2	151	< 5.	40	0.4	NR
29−038−SW−3	401	< 5	187	0.37	NR

LEGEND

SE1 − 250 feet upstream of mine access raod Pony Creek crossing.
SE2 − 1200' downstream of mill ruins below last tailings.
TP1 − Composite of subsamples TP1A−A 1A−B, 2A−A, 2A−B, 2C−A, 2B−A, and 2B−C.
TP2 − Composite of subsamples TP1A−C, 1A−D, 1A−E, and 2B−C.
WR1 − Composite of subsamples WR1, 2, 3A, and 3B.
WR2 − Composite of subsamples WR4A, 4B, 6, 7, 8, and 9.
BACKGROUND − From the Strawberry Mine (29−038−SS−1).
SW1 − Same as sample SE1.
SW2 − Same as sample SE2.
SW3 − Adit discharge at waste rock dump 9.

XRF ANALYSIS RESULTS

STRAWBERRY
PA NO. 29-038

Mine Name: Strawberry PA# 29-038
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-038-SE-3		14048.8	9674.23	2432.25		1039.65	25702.5		70.033 *	167.62		135.888
29-038-SS-1		13844.2	10096	2242.59		853.561 *	31364.5			80.446 *	88.888	186.267
29-038-TP1A-A		15608.4	14608.8	1919.71	249.365 *	1959.91	67299.1			797.979	39.314 *	66.1966
29-038-TP1A-B		19420	2963.29	868.729			18872.7			91.9428 *		32.5896
29-038-TP1A-C		18638.2	2069.99	1292.85			21170.3		41.6191 *	107.312 *		30.3846
29-038-TP1A-D		18608	1153.93	1073.09			17882		88.8153 *	69.5726 *		33.3298
29-038-TP1A-E		26733.1	1257.25	1633.06			19985.8			62.3972 *		24.9741
29-038-TP2A-A		32146.5	2552.81	2016.42			17016.7			55.2722 *	25.9221 *	34.4828
29-038-TP2A-B		51271.7	2867.26	3364.85			29499.5		2114.77	604.343		19.242 *
29-038-TP2B-A		48026.8	2717.04	3073.4			18534.5		141.824 *	251.001		20.0208
29-038-TP2B-B		39831.7	1948.48	1919.95	211.323 *		8575.31			310.25		19.1098
29-038-TP2B-C		38712.8	2625.34	2022.49			17626.8		60.5157 *	203.727		25.2887
29-038-TP2B-D		26528.4	9273.28	3725.2		400.346 *	47554.9		164.996 *	69.3714 *		363.003
29-038-TP2C-A		31243.9	1488.46	1658.25			27332.7		134.815 *	78.3566 *		36.9602
29-038-TP-1-COMP		35816.3	5895.95	2571.76		627.448 *	27200.3		347.003	342.576		50.0057
29-038-TP-2-COMP		31602.5	2548.61	1966.39		216.883 *	22011.6		144.616 *	193.45		37.2789
29-038-WR3-A		17088.6	5231.11	1886.92		300.121 *	42027.3		143.599 *	171.665		93.0954
29-038-WR3-B		17113.8	7791.55	2726.57		412.599 *	39479.3		113.256 *	248.422	67.7179 *	98.7636
29-038-WR4-A		17245.9	6142.93	3061.74	355.136 *	946.174 *	59550		52.6494 *	436.173	91.3442 *	65.4879
29-038-WR4-B		33171.3	1707.91	489.264 *		342.975 *	32446.7		51.8896 *	195.03	99.4376 *	43.3187
29-038-WR-1		21539.1	5774.8	2647.63		879.644 *	37978.5			423.947	74.689 *	53.5129
29-038-WR-1-COMP		26196.7	6049.16	2908.59		738.352 *	45643.9		134.787 *	265.475		73.9713
29-038-WR-2		30665.6	1774.77	2661.59	280.13 *	517.612 *	62588.9		121.695 *	224.01	160.547	
29-038-WR-2-COMP		29136.5	3557.03	2302.71	194.019 *		47534		90.1656 *	147.019	48.4978 *	57.9692
29-038-WR-6		28154.3	1484.16	2779.26			34890.8			54.8211 *		56.7087
29-038-WR-7		26540.3	1227.2	3635.84			70940.9		152.913 *	163.622 *	105.936 *	14.3381 *
29-038-WR-8		12629.7	14889.2	3042.39		1534.45	57201.8				94.4513	136.928
29-038-WR-9		37835.8	8939.96	2633.4			75761.3		65.6479 *	80.7997 *	77.3519 *	36.9752

Mine Name: Strawberry PA# 29-038
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-038-SE-3	452.049			26.6286 *	106.213			688.898		9.85195 *	17.0789 *
29-038-SS-1	198.371				91.8065			526.652			13.9229 *
29-038-TP1A-A	91.6763	72.0662 *		83.9846	129.533			268.211			
29-038-TP1A-B	93.0157		11.1488 *	248.063	95.9731			731.098			
29-038-TP1A-C	85.5512		14.6654	564.894	94.6129			516.4			10.9592 *
29-038-TP1A-D	92.5965		7.95635 *	353.052	106.465			388.563	77.025 *		8.43805 *
29-038-TP1A-E	165.587		13.0436	189.691	120.618			428.229			14.202 *
29-038-TP2A-A	195.42			46.1741 *	147.454			478.203		13.3174 *	14.1534 *
29-038-TP2A-B	381.169			285.627	231.244			544.037		19.917 *	27.4715
29-038-TP2B-A	211.805			115.27	193.137			548.924		22.4478 *	24.2213
29-038-TP2B-B	230.782			1050.19	152.002			365.446		16.7843 *	34.9078
29-038-TP2B-C	177.853		5.00797 *	463.895	156.656			452.076	119.498 *	12.8758 *	26.0778
29-038-TP2B-D	285.735			62.6448 *	119.662			901.257			18.3737 *
29-038-TP2C-A	144.671		6.29544 *	260.205	133.818			447.104			13.869 *
29-038-TP-1-COMP	215.82			262.508	176.164	167.505 *		539.366	119.493 *		23.4729
29-038-TP-2-COMP	134.145		15.9305	498.478	147.773			562.693			22.1806 *
29-038-WR3-A	118.679		14.1994	2909.46	132.942			375.101			16.3754 *
29-038-WR3-B	202.538		6.34491 *	289.296	137.807			479.098			12.4156 *
29-038-WR4-A	130.429		32.9207	255.098	118.392			319.279			5.60966 *
29-038-WR4-B	97.2167		17.973	68.2023	153.192			725.605			17.2809 *
29-038-WR-1	381.302		5.59953 *	109.349	134.071			525.791		32.9094 *	39.1689
29-038-WR-1-COMP	185.289		12.001 *	1384.4	163.15			435.2			16.6767 *
29-038-WR-2	124.753		12.4052 *	123.059	195.16			237.015			9.80439 *
29-038-WR-2-COMP	175.499		18.9903	251.058	147.223			673.371			13.2382 *
29-038-WR-6	277.139		31.8186	414.07	137.805			825.74		14.4009 *	30.2563
29-038-WR-7	154.704		27.8503	231.428	198.817			571.649			
29-038-WR-8	118.251		7.06884 *		112.718			427.336	91.4231 *		5.62901 *
29-038-WR-9	199.471		51.8105	390.389	205.862			556.584	123.169 *		11.0263 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS)
SCORESHEET

STRAWBERRY
PA NO. 29-038

AIMSS SCORESHEET

SITE NAME: STRAWBERRY MINE
PA NUMBER: 29-038

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	9.751
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		90
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	95.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	370538
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	10.860
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		1
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	14
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	60816
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.093
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	279
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		250
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	350
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.083
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	12
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	349
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**4.32**

SITE NAME: STRAWBERRY MINE
PA NUMBER: 29-038

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	400
3		OPEN ADITS	50 EA.	500
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	160
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	1135
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	12
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**272.40**

ROCHESTER

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: EMMA PA#: 29-061

Date: June 18, 1993 Time: 0830

Field Team Leader: Babits, Pioneer

Sampling Personnel: Pierson, TD&H
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (65°F); slight breeze (5 mph); clear; no rain within 24 hours; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #22: WR-6 and shaft; #23: WR-5 and shaft; #24: Series of fenced shafts (WR-5 in background); #25: HMO below fenced area; #26: WR-4 (WR-3 in background) and adit; #27: Tailings pond; #28: WR-2.
Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Possible to reprocess both tailings and waste rock for lead.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): EMMA PA#: 29-061

Legal Description: T 3S ;R 7W ;Sec. 6 ,SE 1/4SW 1/4 1/4

County: MADISON Mining District: ROCHESTER

Latitude: N 45° 34' 37" Longitude: W 112° 02' 19"

Primary Drainage Basin and Code: Big Hole River/10020004
Secondary Drainage Basin: Nez Perce Creek

USGS Quadrangle map name(s): Nez Perce Hollow

Mine Type/Commodities: Hardrock/Gold, Lead, Silver, Zinc

Activity Status: Active ___,Inactive/Exploration ___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): BLM

Relationship to other mines/sites in the area/district: Extensive mining in eastern drainage basins.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Some shaft closures.

General site features: Elevation 6040', Slope 10°,
Aspect Southwest

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 2 acres.
Dimensions:

Predominant vegetation types: Bluebunch, wheat grass, sage, cactus

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 4 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by schist cut by many granite dikes. Site lies on west side of unnamed dry tributary to Nez Perce Creek. Water leaving the site would flow south to junction with Nez Perce approx. 1 mile south of the site.

Mining/milling history, ore type/tenor, host rock, gangue: Operated from the 1890's to the 1940's. Gangue in vein mineralization was composed of altered and mineralized schist with lenses of quartz containing galena, cerussite, and limonite; also present are sphalerite, pyrite, chalcopyrite, and arsenopyrite. Ore in vein or fissure which cuts schistose rock.

Mine Operation?
Shafts - Yes X, No ___, # 6, Comment 5 grated
Adits - Yes X, No ___, # 5, Comment 1 collapsed
Pits - Yes ___, No X, # ___, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes X, No ___. If yes answer the next three questions:

Period(s) of Operation: 1890's to 1940's

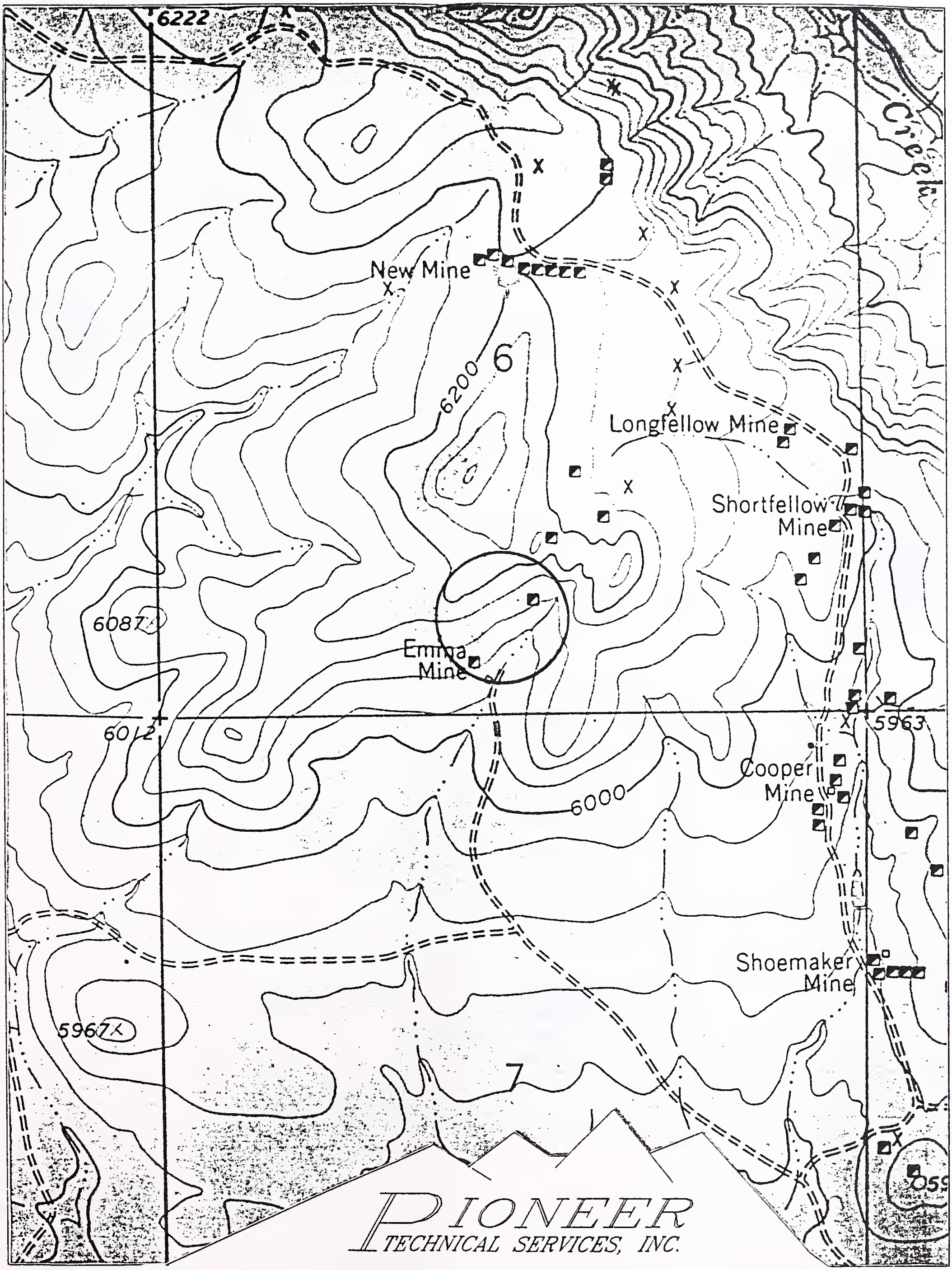
Origin of Ore Milled - Custom Mill ___ Dedicated Mill X; Number and names of mines that supplied mill feed: Unknown, but largest mill area.

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? In 1935, the mill had a 60-ton combination floatation and table concentrating mill. In later reports, a 100-ton amalgamation and concentration was reported; could possibly be the same.

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

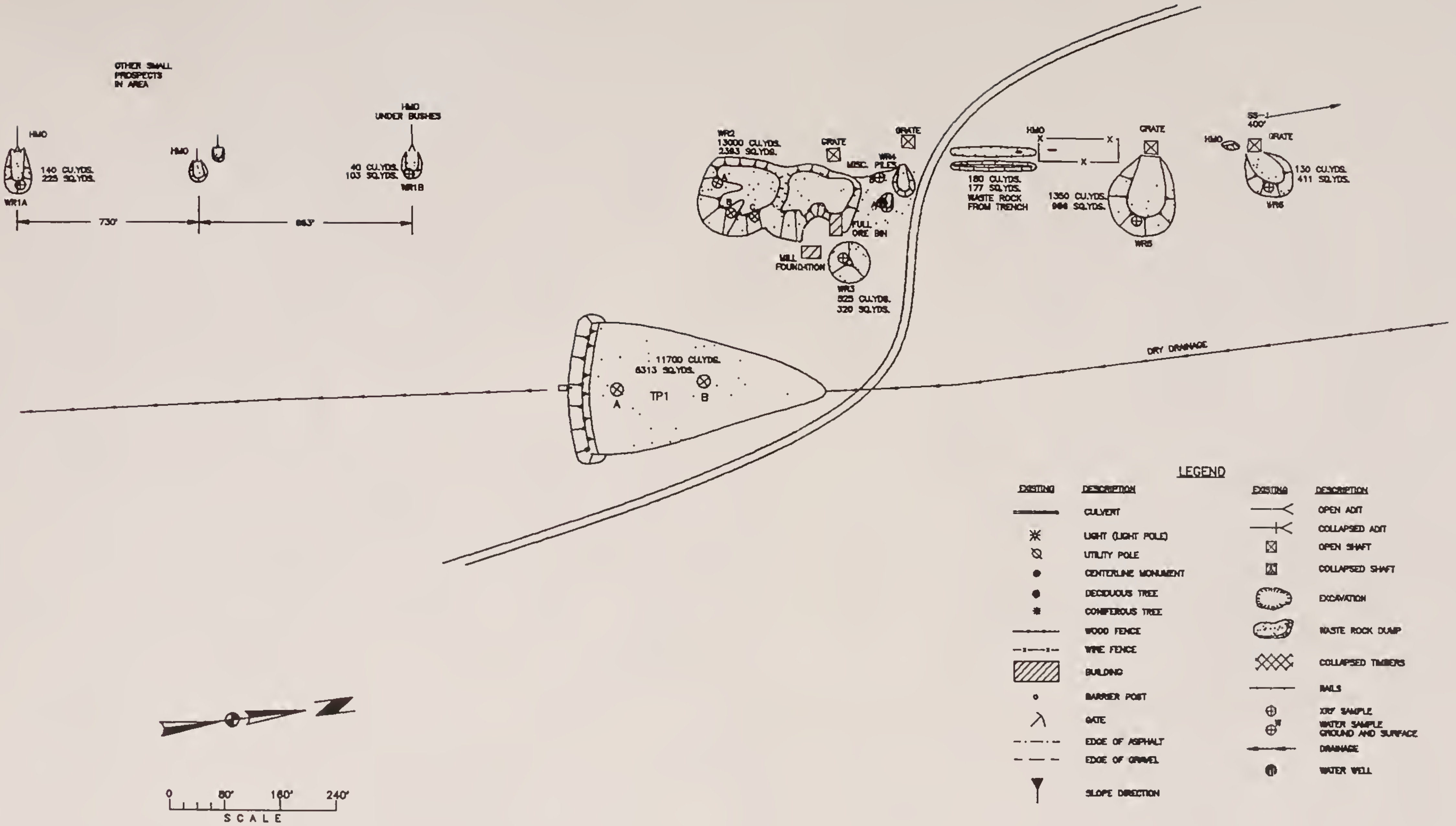
Well No.	Location	Depth	Yield	Static Water Level
M:107651	03S 08W 01 BB	0.0	8.0	35.00
M:107652	03S 08W 01 BBD	63.0	20.0	33.00
M:107653	03S 08W 01 BCB	206.0	1.0	24.00
M:107654	03S 08W 12 DD	0.0	3.0	0.00



PIONEER
TECHNICAL SERVICES, INC.

EMMA, P.A. NO. 29-061

T03S, R07W, SECTION 06
SCALE: 1" = 1000'



PIONEER

DRAWN JTP DATE 5 AUG 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TDH

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
EMMA PA# 29-061
ROCHESTER DISTRICT MADISON COUNTY

SHEET NO.

29-061.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): Sand

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): 9 feet at deepest location; sand to 5 feet, then clay to 9 feet.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Moist

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): The timber impoundment is almost nonexistent.

Comments on potential for mitigation: Revegetate/reprocess

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	11,700	North end of pond; 0'-3', brown sand	None	< 3.5 (D)	0.03	29-061-TP-1	06/18/93 1310	T-Metals, ABA
TP-1A-B	TAIL		North end of pond; 3'-5.5', brown sand	None	NM	NM			
TP-1A-C	TAIL		North end of pond; 5.5'-9', dark gray	None	NM	NM	29-061-TP-2	06/18/93 1320	T-Metals, ABA
TP-1A-D	TAIL		North end of pond; 9', underlying soil	None	NM	NM			
TP-1B	TAIL		South end of pond	None	5.0 (D)	0.04			
WR-1A	WR	140	Lowest dump, east side	None	6.8 (D)	0.05	29-061-WR-1	06/18/93 1350	T-Metals, ABA
WR-1B	WR	40	Lowest dump, east side	None	7.0 (D)	0.05			
WR-2A	WR	13,000	South side of WR-2	None	5.0 (D)	0.06	29-061-WR-2	06/18/93 1355	T-Metals, ABA
WR-2B	WR		South side of WR-2	None	< 3.5 (D)	0.03			
WR-2C	WR		East side of WR-2	None	< 3.5 (D)	0.04			
WR-3	WR	525	Top of pile	None	4.83 (S)	0.05			
WR-4A	WR		East side of WR-4	None	6.0 (D)	0.05			
WR-4B	WR		East side of WR-4	None	< 3.5 (D)	0.06			
WR-5	WR	1,350	East side of WR-5	None	5.99 (S)	0.07	29-061-WR-3	06/18/93 1400	T-Metals, ABA
WR-6	WR	130	East side of WR-6	None	4.95 (S)	0.06			
SS-1	BKGRND	N/A	Background soil on top of hill upgradient of WR-6	N/A	5.25 (S)	0.05	29-061-SS-1	06/18/93	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-061-TP-1 is composite of TP-1A-A and -1A-B and TP-1B. 29-061-TP-2 is composite of TP-1A-C and -1A-D. 29-061-WR-1 is composite of WR-1A and -1B, and WR-6. 29-061-WR-2 is composite of WR-2A through -2C, WR-3, and WR-4A and -4B.
NM = Not Measured

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X, Number:____ Identification:____

Filled shafts: Yes___, No X, Number:____ Identification:____

Seeps/Springs: Yes___, No X, Number:____ Identification:____

Groundwater wells within 4 miles?: Yes X, No___;
Number of well logs: 5

Distance to nearest well used for drinking? 2 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X, Unlikely____.
Uncontained sources containing in some areas very elevated metal values.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Unnamed drainage

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): Unnamed drainage flows through tailings.

Approximate Flood frequency? X 1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? Unknown
High Flow:____________, Average Flow:____________

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between tailings and drainage.

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Tailings site in intermittent drainage.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Fishing, irrigation, wetland in the unnamed drainage into Nez Perce Creek into Big Hole.

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): No water in intermittent drainage.

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

____

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 acre

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Carbonate precipitate in rocks.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	Pyrite	Wet	2,952	2,952	Yes	Moderate
WR-2	Pyrite; pH	Wet	21,537	21,537	Yes	Moderate
WR-3	Pyrite; pH	Wet	2,880	2,880	Yes	Moderate
WR-4	Pyrite; pH	Wet	Small	Small	Yes	Moderate
WR-5	Pyrite	Wet	8,874	8,874	Yes	Moderate
WR-6	Pyrite; pH	Wet	3,699	3,699	Yes	Moderate
TP-1	pH	Wet	47,817	47,817	Yes	High/Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_None_______

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads?_Unrestricted_____

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes_X_, No___, Comment_Adits and shaft___

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High_X_, Medium___, Low___
Fisheries Habitat and Species Classification - _Not Rated_
Sport Fishery Classification - _Not Rated_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_5_, types and locations:___
Four adits and one shaft________

Hazardous structures: Yes_X_, No___, Number_1_, types and locations:_
Ore bin________

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_,
Number____, types and locations:________

Fire and/or Explosion hazards: Yes_X_, No___, Explain:_Wood ore bin_

Bibliography

MBMG, Geology and Ore Deposits of the Rochester and Adjacent Mining Districts, Madison County, Montana, Memoir No. 19, Written by Uuno M. Sahinen, January 1939.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory for the Emma mine, Prepared by Daphne Digrindakis, May 21, 1985.

USGS, Topographic Map, Nez Perce Hollow, Montana, 7 1/2 minute Quadrangle, 1961.

LABORATORY ANALYTICAL DATA

EMMA
PA NO. 29-061

Emma PA# 29-061
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 06/18/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-061-TP-1	3710	29.9	115 JX	7.8	9	492	46700	0.5	727	21	8990	95 J	7400	NR
29-061-TP-2	5840	33.7	495 JX	16.2	7	1440	59600	0.199	1370	33	29500	194 J	46200	NR
29-061-WR-1	2910	157	72.8 JX	17.4	20.5	160	38200	1.99	1670	33	6200	34 J	4490	NR
29-061-WR-2	9500	30.5	82.3 JX	10.8	5.4	552	61100	1.08	943	22	27500	100 J	9100	NR
29-061-WR-3	11900	30	206 JX	21.7	5.5	870	54600	3.88	2030	23	41200	40 J	9200	NR
BACKGROUND	56	169	0.8 JX	13.8	29.4	34.2	25300	0.014 U	462	26	30	4 UJ	119	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-061-TP-1	1.51	47.2	6.08	−41.	1.01	0.19	0.31	5.94	0.14
29-061-TP-2	5.99	187	23.3	−164	<0.01	4.34	2.44	136	−112
29-061-WR-1	0.04	1.25	40.1	38.9	0.03	<0.01	0.01	0	40.1
29-061-WR-2	3.41	107	4.61	−102	1.25	0.78	1.38	24.4	−19.8
29-061-WR-3	0.44	13.7	15.2	1.47	0.41	<0.01	0.05	0	15.2

LEGEND

TP1 – Composite of subsamples TP1B-A, 1A-A, and 1A-B.
TP2 – Composite of subsamples TP1A-C and 1A-D.
WR1 – Composite of subsamples WR1AA, 1B, and 6.
WR2 – Composite of subsamples WR2A, 2B, 2C, 4A, and 4B.
WR3 – Sample of the WR5 subsample.
BACKGROUND – On top of the hill, upgradient of waste rock dump 6. From the Emma Mine (29-061-SS-1).

XRF ANALYSIS RESULTS

EMMA
PA NO. 29-061

Mine Name: Emma PA# 29–061
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29–061–SS–1			7224.98	3260.06		1374.57 *	40575		60.3323 *	184.237 *	68.8941 *	182.107
29–061–TP1A–A			3813.61	2903.33		1475.61 *	49953.4		291.578	5742.72	2777.33	181.507
29–061–TP1A–B			2620.6	2377.88		420.122 *	47473.5		278.27 *	2850.79	2591.42	146.467
29–061–TP1A–C			2047.32	2797.11		1788.72 *	50489.6		1852.44	39120.8	1349.02 *	311.112
29–061–TP1A–D			4789.37	2328.86		1457.04 *	46260.5		515.295	18673.6	2193.05	160.985
29–061–TP1B–A			3742.28	2650.8		1710.8	53460.5		370.559	9365.36	3361.66	199.526
29–061–TP–1–COMP			3412.4	2923.01		1016.59 *	49077.6		379.746	6784.84	2907.92	157.852
29–061–TP–2–COMP			5108.43	2346.78		2346.31	54420		1489.18	39122.1	2390.84	289.375
29–061–WR2–A			14501.6	2832.52		2384.29	71504.4		671.911	13025.8	4587.21	386.623
29–061–WR2–B			4815.85	1157.41		863.599 *	55394.4		373.882	10354.5	9652.21	314.935
29–061–WR2–C			1286.22	952.898			38483.9		314.834	697.424	17101.5	274.25
29–061–WR4–A			7453.61	3028.44		3302.3	74567.7		685.707	20885.5	5097.62	382.552
29–061–WR4–B			2160.22	1950.94			66819		343.749	2112.88	6606.87	145.143
29–061–WR–1		23386.1	13288.3	3992.8		2002.33	53066.4			1365.72	2245.44	162.546
29–061–WR–1–COMP			18161.6	4013.34		2001.9	56686.4		100.684 *	2869.75	2057.32	150.703
29–061–WR–2–COMP			8262.55	2519.26		1836.3	68550.1		615.674	11390.3	7216.84	307.413
29–061–WR–3			10472.3	3897.14		1768.5 *	77677.7		787.37	8637.94	5927.35	238.079
29–061–WR–5			2977.76	3516.75		2368.72	103311		914.617	7133.78	11047.3	265.096
29–061–WR–6			29641.8	3671.1		1465.08 *	56038.8		201.468 *	7317.14	1693.52	208.319

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29–061–SS–1	327.348			27.5598 *	119.296			486.109	95.9847 *		11.9515 *
29–061–TP1A–A	236.01			5043.12	148.27	237.675 *	95.2318 *	231.902	101.763 *		19.3367 *
29–061–TP1A–B	223.291			4964.32	153.496		107.545 *	252.058	99.4071 *		19.3227 *
29–061–TP1A–C	159.24			25894.8	198.443	754.096	310.819	241.883	374.922 *		
29–061–TP1A–D	188.61			5104.69	126.473	277.626 *	107.336 *	210.028	210.203 *		
29–061–TP1B–A	244.04			5669.72	145.544	194.966 *	140.529 *	182.776	140.976 *		23.5365 *
29–061–TP–1–COMP	199.475			6456.41	149.371	135.275 *	129.166 *	231.045	146.891 *		21.0113 *
29–061–TP–2–COMP	163.367			20644.6	182.41	835.343	214.633 *	210.89	361.028 *		
29–061–WR2–A	253.091			6619.59	157.195	267.721 *	71.9246 *	220.711	185.633 *		30.7445 *
29–061–WR2–B	174.602			10200.6	169.908	176.148 *	184.252	161.077	196.329 *		31.7589 *
29–061–WR2–C	134.631			7751.63	160.371		129.757 *	147.981	153.674 *		
29–061–WR4–A	316.559			9172.7	144.331	361.361 *	366.151	217.832	235.755 *		32.3032 *
29–061–WR4–B	222.156			8828.76	171.412	200.65 *	76.9098 *	159.846	195.525 *		
29–061–WR–1	304.799			431.823	157.92			410.798	72.7056 *		16.9113 *
29–061–WR–1–COMP	332.019			1546.63	137.982			387.483	84.1394 *		15.2376 *
29–061–WR–2–COMP	261.884			8863.73	147.95	260.297 *	200.627	231.873	206.007 *		22.1425 *
29–061–WR–3	316.142			9422.18	166.438	169.996 *	250.687	280.936	184.18 *		
29–061–WR–5	212.71			17721.9	178.769	341.007 *	234.096	224.075	199.113 *		33.5027 *
29–061–WR–6	375.643			3298.27	129.745	130.584 *	73.8168 *	376.102	126.727 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

EMMA
PA NO. 29-061

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

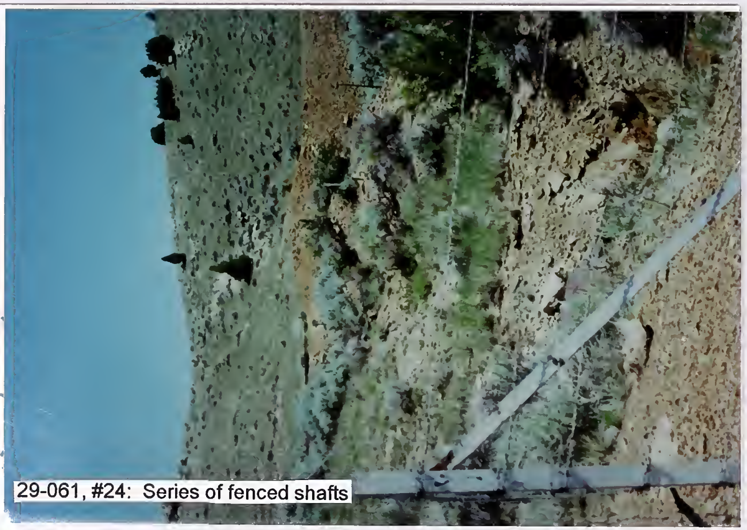
SITE NAME: EMMA
PA NUMBER: 29-061

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	501.498
6	GW - TARGETS	WELLS - 1 MI. x 2.5		10.0
7		WELLS - 1 TO 4 MI		1
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	11.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	220659
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		0
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	0
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	0
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	539.980
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		20
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	100
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.042
29	AIR - TARGETS	POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	11
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	6646
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.617
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**2.27**

LINE NO.		SITE SAFETY		SITE NAME: EMMA PA NUMBER: 29-061
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	200
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	340
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**

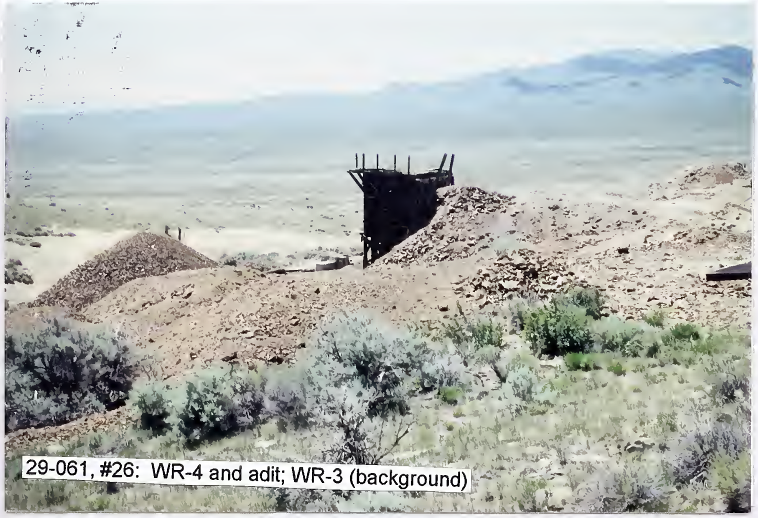
29-061, #22: WR-6 and shaft

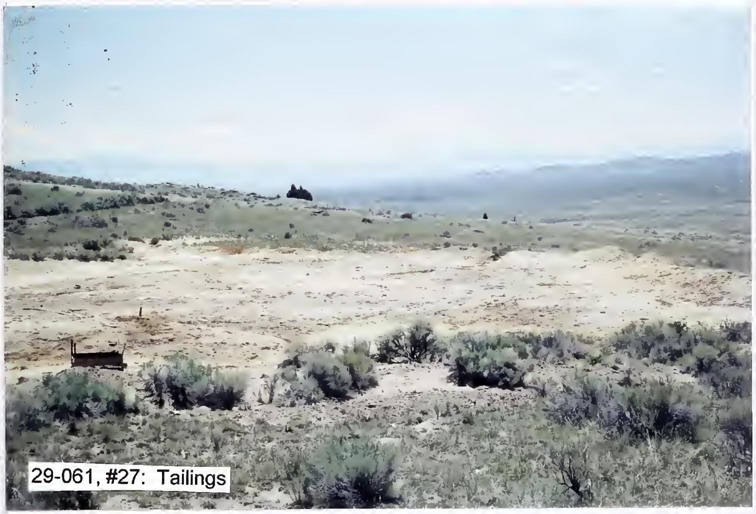
29-061, #23: WR-5 and shaft

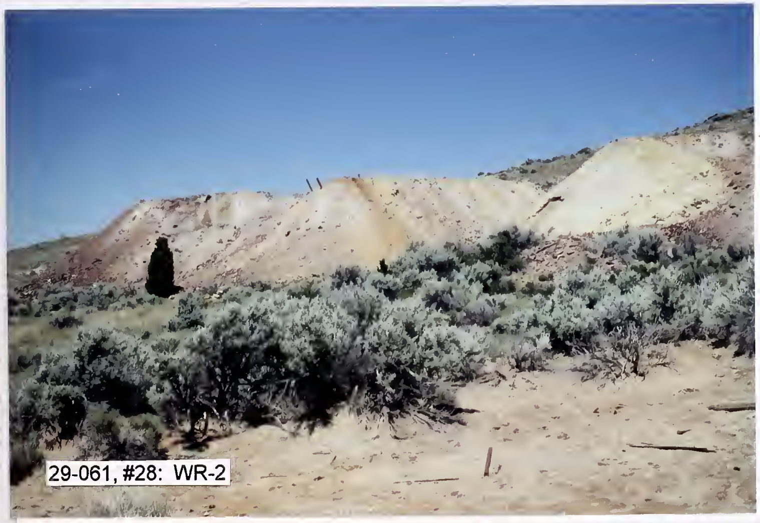


29-061, #24: Series of fenced shafts

29-061, #25: HMO below fences


29-061, #26: WR-4 and adit; WR-3 (background)


29-061, #27: Tailings


29-061, #28: WR-2

Thistle #1
29-061
#23

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: THISTLE MINE AND TAILINGS PA#: 29-073

Date: June 15, 1993 Time: 1300

Field Team Leader: Tuesday/Babits; Pioneer

Sampling Personnel: Belanger, Lasher, Clark;
Pioneer
Pierson; TD&H

Visitors: None

Weather/Seasonality Observations: Partly cloudy changing to rain and hail; mild (45°F); slight breeze (< 5 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #28: #14 exploration hole; #29: #15 exploration hole; #30: Shaft #12; #31: WR-15; #32: WR-14; #33: WR-12; #34: Adit at WR-13; #35: WR-13; #36-#37: WR-1. Roll #2: #2: Shaft #16; #3: WR-3; #4: Shaft #17; #5: Shaft #19; #6: Adit 20. Roll #3: #1: SE-1 location; #2: Tails entering outer creek by road; #3: Tails enter creek, middle; #4: SE-2 located 60' downstream; #5: Profile of upper tails pond; #6-#7: Lower pond panorama; #8-#10: Upper pond panorama; #11: SE-3 location downstream beyond tails. No video was taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): Large tailings pond in Rochester Creek floodplain is most likely from this mill, though could be from anywhere in the district.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Regrade, cover, runon and runoff control, and regevetate tailings. Regrade and revegetate waste rock. Close HMO's.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): THISTLE MINE AND MILLSITE PA#: 29-073

Legal Description: T 3S ;R 7W ;Sec. 5 ,SE 1/4SW 1/4 ___1/4

County: MADISON Mining District: ROCHESTER

Latitude: N 45° 37' 27" Longitude: W 112° 29' 28"

Primary Drainage Basin and Code: Rochester Creek/10020004
Secondary Drainage Basin: Rochester Creek

USGS Quadrangle map name(s): Twin Bridges

Mine Type/Commodities: Hardrock/Gold, Silver, Lead

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Daniel Harris and Lee Harris, 1507 Meadowlark Drive, Great Falls, MT 59404. (406) 452-0444.

Relationship to other mines/sites in the area/district: Many mines (active and abandoned) are in the Rochester District.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Past DSL shaft fencing; no reclamation evidenced; tailings bermed.

General site features: Elevation 5840', Slope 24°, Aspect Northeast

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 6.2 acres.
Dimensions:

Predominant vegetation types: Sage, grasses

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The lead is a fissure in micaceous schists. The site lies on the southwest side of Rochester Gulch. Tailings lie in the stream bottom with the dumps located on the hillside above. Rochester Creek is identified as an intermittent creek and flows northeast past the site.

Mining/milling history, ore type/tenor, host rock, gangue: The operating history is unknown; ore deposits are well defined veins in micaceous schists generally associated with dikes of aplitic granite. Ore is fissure filling with quartz gangue, some iron-stained. Ore minerals are galena with native gold and pyrite with some copper oxides.

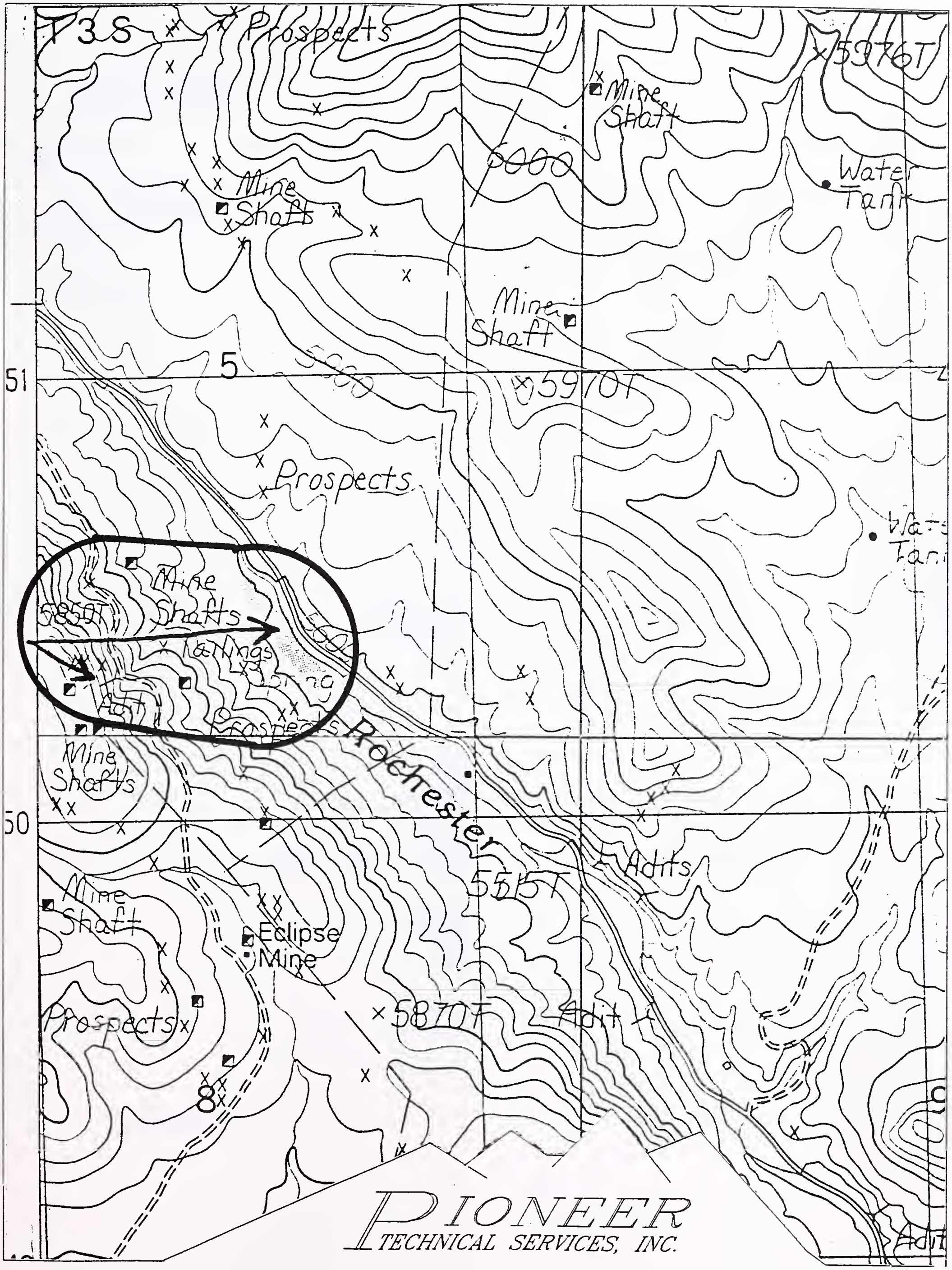
Mine Operation?
Shafts - Yes X, No ___, # 6, Comment 4 open; no restrictions
Adits - Yes X, No ___, # 8, Comment 6 open; no restrictions
Pits - Yes X, No ___, # 1, Comment 40'x40'x20'deep
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes X, No ___. If yes answer the next three questions:

Period(s) of Operation: Unknown

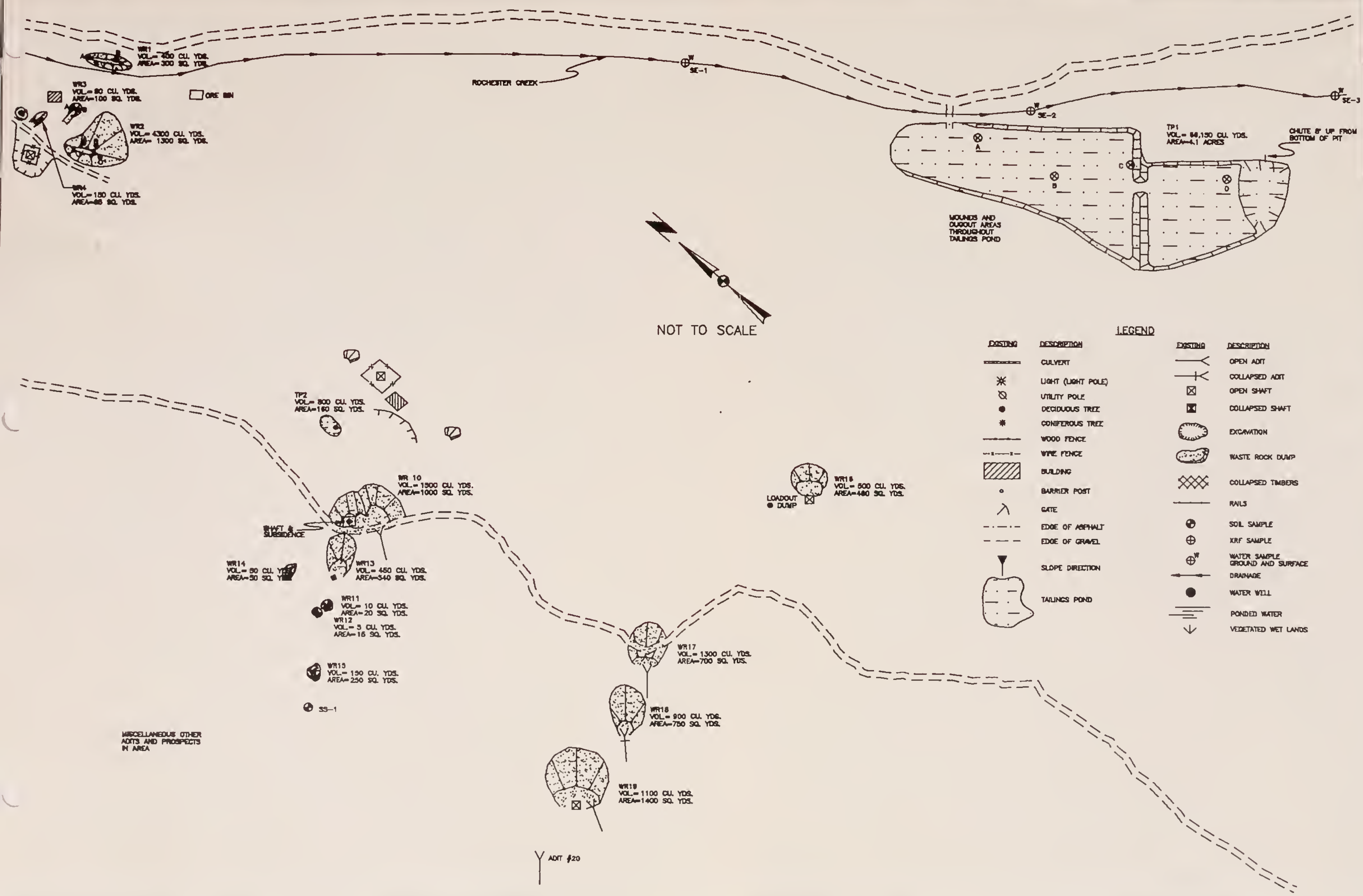
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? The site was reported to have been cyanide heap leach process, somewhere between the 1900 to 1950s.



PIONEER
TECHNICAL SERVICES, INC.

THISTLE #1, P.A. NO. 29-073
T03S, R07W, SECTION 05
SCALE: 1" = 1000'



DRAWN JTP DATE 20 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

THISTLE No. 1 PA# 29-073
ROCHESTER DISTRICT MADISON COUNTY

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay)**:** Mostly silty sand with layers of clay.

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color)**:** Deepest is 12 feet, but have been moved around and piled in various locations around the impoundment.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments)**:** Both; wet where dugout and ponded surface water.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches)**:** Mostly bermed to prevent runoff of tailings, but few breaches on upper pond.

Comments on potential for mitigation: Do a better job of runon/runoff control and cover; potential for reprocess.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Babits, Belanger, Pierson, Clark, Lasher*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	400	North side of creek; west end	None	6.6 (D)	0.04	29-073-WR-1	06/15/93 2240	T-Metals, ABA
WR-1B	WR		North side of drainage; northeast end	None	6.8 (D)	0.04	29-073-WR-2	06/15/93 2245	T-Metals, ABA
WR-10	WR	1,500	Below upper road; east of fenced shaft	None	N/A	N/A	N/A	N/A	N/A
WR-11	WR	10	West side of dump near top	None	6.8 (D)	0.03			
WR-12	WR	3	North side of dump half way down pile	None	6.4 (D)	0.05			
WR-13	WR	400	Above WR-10	None	6.8 (D)	0.04			
WR-14	WR	50	West side of dump near top	None	6.65 (D)	0.025			
WR-15	WR	150	North side near bottom	None	6.8 (D)	0.03			
WR-16	WR	500	Waste rock with loadout	None	N/A	N/A	N/A	N/A	N/A
WR-17	WR	1,300	Waste rock cut by upper road	None	N/A	N/A	N/A	N/A	N/A
WR-18	WR	500	Just above WR-17	None	N/A	N/A	N/A	N/A	N/A
WR-19	WR	1,100	Just above WR-18	None	N/A	N/A	N/A	N/A	N/A
SS-1	BKGRND	N/A	Background soil above WR-15	N/A	N/A	N/A	29-073-SS-1	06/15/93 1425	T-Metals

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-073-WR-1 is composite of WR-1A and WR-12. 29-073-WR-2 is composite of WR-1B, WR-11, and WR-13 through -15.

*Continued on next page

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: Tuesday, Babits, Belanger, Pierson, Clark, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	56,150	North corner TP-1; 0'-3', orange sand	Breached dams	5.0 (D)	0.04	29-073-TP-1B	06/15/93 1700	T-Metals, ABA
TP-1A-B	TAIL		North corner TP-1; 3'-6', gray clay/sand	Breached dams	< 3.5 (D)	0.04			
TP-1A-C	TAIL		North corner TP-1; 6'-9', orange clay	Breached dams	< 3.5 (D)	0.05			
TP-1B-A	TAIL		Northeast end of pond; 0'-3', orange clay	Breached dams	< 3.5 (D)	0.04			
TP-1B-B	TAIL		Northeast end of pond; 3'-6', orange sand	Breached dams	< 3.5 (D)	0.04			
TP-1C-A	TAIL		West end of pond; 0'-3', brown sand	Breached dams	< 3.5 (D)	0.04	29-073-TP-1A	06/15/93 1700	T-Metals, ABA
TP-1C-B	TAIL		West end of pond; 3'-6', gray sand	Breached dams	< 3.5 (D)	0.04			
TP-1C-C	TAIL		West end of pond; 6'-9', yellow gravels/sand	Breached dams	< 3.5 (D)	0.04			
TP-1C-D	TAIL		West end of pond; 9'-12', black clay	Breached dams	< 3.5 (D)	0.04			
TP-1D-A	TAIL		South end of pond; 0'-3', brown sand	Breached dams	< 3.5 (D)	0.05			
TP-1D-B	TAIL		South end of pond; 3'-6', orange clay	Breached dams	< 3.5 (D)	0.05			
TP-1D-C	TAIL		South end of pond; 6'-9', brown sand	Breached dams	3.6 (D)	0.05			
TP-2A-A	TAIL	800	Upper small tailings near mine	Ponded	6.0 (D)	0.03			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-073-TP-1A is composite of TP-1C-A through -1C-C, and TP-1D-A (sandy). 29-073-TP-1B is composite of TP-1A-A and -1A-C, TP-1B-A, and TP-1D-B (clayey).

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes_X_, No___,
Number of well logs:_5___

Distance to nearest well used for drinking?_3 miles_______

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
Uncontained sources with elevated metal values. Tailings in floodplain of Rochester Creek; shallow groundwater.

Other observations/notes:_N/A_______

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Rochester Creek; dry by tailings and upstream, but flowing downstream approx. 2000 feet.

Dry streambeds: Yes ____, No X , Name(s): ____

Other surface water: Yes ____, No X , Name(s)/Description: ____

Waste materials within any floodplain: Yes X , No ___ Source ID(s): Tailings in Rochester Creek.

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? Dry during investigation
High Flow: 1 cfs , Average Flow: 0 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet (Tailings in Rochester Creek).

Surface water draining onto or through waste sources: Yes ____, No X ,
Describe: Rochester Creek is adjacent to tailings (NE).

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, wetland, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes ____, No X , Distance downstream (ft)? N/A Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): Tailings in stream up from site and along upper part; no tailings observed downstream from lower tailings impoundment.

SURFACE WATER INVENTORY FORM

SAMPLERS: Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	Upstream of tailings in Rochester Creek (dry)	N/A	N/A	N/A	N/A	N/A	N/A	29-073-SE-1	06/15/93 1745	T-Metals
SE-2	SE	At breach where tailings flow into creek (60' down)	N/A	N/A	N/A	N/A	N/A	N/A	29-073-SE-2	06/15/93 1800	T-Metals
SE-3	SE	Downstream from all tailings impoundments in Rochester Creek	N/A	N/A	N/A	N/A	N/A	N/A	29-073-SE-3	06/15/93 1830	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): No water samples taken; no water in creek.

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Babits, Belanger, Pierson, Clark, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	FEOX	Dry	2,700	2,700	Yes	Low
WR-10	FEOX	Dry	9,000	9,000	Yes	Low
WR-11	FEOX	Dry	180	180	Yes	Low
WR-12	FEOX	Dry	135	135	Yes	Low
WR-13	FEOX	Dry	9,000	4,860	Yes	Low
WR-14	FEOX	Dry	450	450	Yes	Low
WR-15	FEOX	Dry	2,250	2,250	Yes	Low
WR-16	FEOX	Dry	9,000	4,320	Yes	Low
WR-17	FEOX	Dry	6,300	6,300	Yes	Low
WR-18	FEOX	Dry	9,000	6,750	Yes	Low
WR-19	FEOX	Dry	12,600	12,600	Yes	Low
TP-1	FEOX	Partial	178,596	178,596	Yes	High
TP-2	FEOX	Dry	1,440	1,440	Yes	Moderate

Notes and Clarifications: ____

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No__X__, Describe:____

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments__None__________________________________

Evidence of recreational use on site: Yes__X__, No___, Describe:__Off-road vehicle tracks on tailings__________________

Accessibility - Fences, warning signs, closed roads?__Unrestricted__
____

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No__X__, Comment________________
Wilderness Area - Yes___, No__X__, Comment________________
T&E Species Habitat - Yes___, No__X__, Comment________________
Bat Habitat - Yes___, No__X__, Comment________________

Primary Drainage___; Secondary Drainage___; No Information__X__:

Riparian Habitat Quality - High___, Medium___, Low___
Wetlands Frontage - High___, Medium___, Low___
Fisheries Habitat and Species Classification - ___
Sport Fishery Classification - ___

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes__X__, No___, Number__10__, types and locations:___
Four open shafts; six open adits________________________
____

Hazardous structures: Yes___, No__X__, Number____, types and locations:_
____
____

Unstable highwalls, pits, trenches, slopes: Yes___, No__X__, Number____, types and locations:________________________
____
____

Unstable waste piles, impoundments, undercut banks: Yes____, No__X__, Number____, types and locations:________________________
____
____

Fire and/or Explosion hazards: Yes___, No__X__, Explain:________________
____
____

Bibliography

MBMG, Mineral and Industry File 90.0, Thistle Mine, Madison County, Montana.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory Form for Thistle, Prepared by Daphne Digrindakis, February 1, 1986.

USGS, Mining Districts of the Dillon Quadrangle, Montana, and Adjacent Areas, Bulletin 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Twin Bridges, Montana, 7 1/2 minute Quadrangle Map, 1989.

LABORATORY ANALYTICAL DATA

THISTLE NO. 1
PA NO. 29-073

Thistle PA# 29–073
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE:

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29–073–SE–1	124	83.1	0.5	4.3	21.8	83.7	12600	0.015	130	11	71	< 3	32	NR
29–073–SE–2	590	49.9	1.6	4.9	14.7	162	19600	0.087	169	13	650	6	64	NR
29–073–SE–3	291	52.7	< 0.6	6.9	18.1	66.7	20400	< 0.024	131	17	204	< 4	43	NR
29–073–TP–1A	2730	39	3.8	3.9	4.5	371	32300	0.255	67.4	6	2500	27	100	NR
29–073–TP–1B	6850	97.9	10.5	6	18.1	887	67300	3.51	122	10	5850	59	117	NR
29–073–WR–1	13	61.3	4.3	13.7	28.4	30.8	36100	0.366	738	26	309	< 3	187	NR
29–073–WR–2	275	68.5	37.3	31.8	38.3	67.7	45900	2.21	1610	53	1720	< 4	1720	NR
BACKGROUND	19	144	0.6	14.1	47.5	32.6	26800	0.02 J	481	29	30	< 3 UJ	74	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29–073–TP–1A	1.15	35.9	–6.7	–42.	0.85	0.15	0.15	4.69	–11.4
29–073–TP–1B	1.23	38.4	–2.9	–41.	1.16	0.01	0.06	0.31	–3.26
29–073–WR–1	0.1	3.12	70.7	67.6	<0.01	0.02	0.1	0.62	70.1
29–073–WR–2	0.14	4.37	74.6	70.2	0.01	0.02	0.11	0.62	74

LEGEND

SE1 – Upstream of tailings in Rochester Creek.
SE2 – At breach where tailings flow into creek.
SE3 – Downstream from tailings impoundment in Rochester Creek.
TP1A – Composite of subsamples TP1C–A, 1C–B, 1C–C, and 1D–
TP1B – Composite of subsamples TP1A–A. 1A–C, 1B–A, and 1D–
WR1 – Composite of subsamples WR1A and 12.
WR2 – Composite of subsamples WR1B, 11, 13, 14, and 15.
BACKGROUND – Above WR15. From the Thistle Mine (29–073–SS–1).

XRF ANALYSIS RESULTS

THISTLE NO. 1
PA NO. 29-073

Mine Name: Thistle I PA# 29-073
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-073-SS-1		19828.8	13051.4	3674.2		970.51 *	41790.4			120.302 *		158.853
29-073-TP1A-A		12570.5	1669.91	1732.08			51694		212.734 *	194.779 *	2286.18	100.896
29-073-TP1A-B		31079.8	2028.45	3231.09			74207.8		2718.34	182.659 *	10563	645.634
29-073-TP1A-C	299 $	35408 $	2912 $	3633 $			90257 $	659 $	670 $	163 $	8837 $	678 $
29-073-TP1B-A		32902.8	2180.84	2365.55			73681.7	542.807 *	460.334	210.373 *	5244.28	267.388
29-073-TP1B-B		18056.8	9658.59	3155.15		583.294 *	50612.2		403.922	156.854 *	1751.68	248.225
29-073-TP1C-A		12856.3	1335.15	1250.78			43314		212.335 *	171.349 *	2322.29	93.1853
29-073-TP1C-B		10943	1659.73	1336.65			32128.8		315.215	148.544 *	2427.47	94.5204
29-073-TP1C-C		9882.9	927.699	1282.1			18431.6		151.523 *	119.205 *	926.478	105.808
29-073-TP1C-D		24483.6	1771.34	2785.86			98903.6		550.835	290.617	39325.2	338.759
29-073-TP1D-A		20626.4	1676.39	3336.39			55104.1		256.765 *	145.08 *	3376.52	286.918
29-073-TP1D-B		26842.5	2395.41	2325.13			66191.4	544.962 *	947.976	217.332 *	7588.22	487.211
29-073-TP1D-C		11839.4	9225.51	1916.26		902.674 *	32810.3		555.314	152.444 *	289.926	185.54
29-073-TP1-A-COMP		11421.4	1665.57	1385.44	129.357 *		28595.6		166.357 *	130.333 *	1684.15	109.313
29-073-TP1-B-COMP		37410.5	2940.76	3077.79			80771.4	787.358 *	651.997	277.098	7399.61	491.715
29-073-TP2A-A		13472.9	2836.01	788.367			22006.1		121.235 *	393.927		62.9429
29-073-WR1-A	588.858 *	25824.9	11423.7	1271.94	17247.6	32578.3	2152.22	1446.06	141.247 *	118.501 *		15.7698 *
29-073-WR1-B	389.524 *	11102.4	27372	3149.36		917.197 *	46324.9		146.447 *	850.944		149.242
29-073-WR-11		6486.55	14384.2	4997.52		500.333 *	47777.2	503.225 *		1799.63		78.3799
29-073-WR-12		15231	36839.8	2188.5	177.743 *	1016.69 *	34246			169.358		175.145
29-073-WR-13	290.193 *	20187.6	13820.1	2453.51		1698.04	53362.4		65.3015 *	973.471		79.5665
29-073-WR-14		18876.1	20844.9	2574.21		2684.84	55568.2			1020.43	451.246	171.953
29-073-WR-15		13647.3	20809.6	1856.92		2804.78	39350.1			1078.87	838.922	227.038
29-073-WR-1-COMP		14013.2	32056.3	2201.96		1113.93 *	37518.2	417.913 *		184.968 *		190.178
29-073-WR-2-COMP	391.533 *	17375.2	25801.9	3545.96		1892.51	51169		61.8351 *	1099.54	170.115 *	160.258

Mine Name: [illegible]histle I PA# 29-073
XRF Field Analyses
Results in PPM
Page 2 of 2.

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-073-SS-1	235.188			29.2907 *	113.269			371.516			14.7044 *
29-073-TP1A-A	142.593		7.53418 *	2121.18	60.7568			146.201	111.935 *		17.2526 *
29-073-TP1A-B	196.917		11.9912 *	3501.61	181.341	154.797 *		285.664	144.543 *		23.8179 *
29-073-TP1A-C	255 $		53 $	8690 $	185 $	157 $	281 $	294 $	123 $		53 $
29-073-TP1B-A	153.51		39.0092	3697.53	164.259			363.176	113.187 *		34.0031 *
29-073-TP1B-B	250.832		11.3257 *	1100.89	83.4888			392.452			13.413 *
29-073-TP1C-A	137.939			2286.7	77.3988			156.001			21.2759 *
29-073-TP1C-B	89.3023		19.8251	1563.74	79.3594		110 *	73.9742	59.6863 *		13.2079 *
29-073-TP1C-C	73.9944		29.0007	1838.1	74.9553		94.6335 *	68.1229	82.6587 *		25.2575 *
29-073-TP1C-D	131.344		295.716	5716.83	155.339	464.05 *	363.842	158.985	247.994 *		28.3834 *
29-073-TP1D-A	201.891		19.8856 *	2437.74	114.811		97.171 *	190.651	135.616 *		29.235 *
29-073-TP1D-B	194.652		36.9513	4502.67	204.352		143.494 *	260.974	109.009 *		25.9867 *
29-073-TP1D-C	233.289			149.069	67.0352			317.475			10.6408 *
29-073-TP1-A-COMP	90.1481		12.1384 *	1602.11	63.7976		142.67	98.6974	433.78 *		
29-073-TP1-B-COMP	204.539		48.3912	5809.09	202.169	203.293 *	160.268 *	286.773			40.5159 *
29-073-TP2A-A	64.1033		155.372	1284.91	74.4335			137.566			12.7292 *
29-073-WR1-A		146.344 *	14.9585 *	121.784	122.901			29.8734 *	723.114		22.7721 *
29-073-WR1-B	122.249			827.214	64.3593		44.1242 *	236.581	483.249 *	8.97117 *	
29-073-WR-11	136.021			1096.62	50.3308		48.3237 *	163.444	294.049 *	10.7797 *	
29-073-WR-12	212.492			170.146	100.979		55.9651 *	313.525	450.595 *	14.432 *	10.9553 *
29-073-WR-13	102.193			1283.64	112.734		43.0385 *	235.112	308.972 *	18.0866 *	
29-073-WR-14	241.388			629.857	141.683			357.378			22.7515 *
29-073-WR-15	119.627			657.147	97.9564			236.184			
29-073-WR-1-COMP	189.009			130.359	104.797			299.535			12.8012 *
29-073-WR-2-COMP	138.892			1071.81	105.156			272.596	328.43 *	14.9757 *	

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

THISTLE NO. 1
PA NO. 29-073

AIMSS SCORESHEET

SITE NAME: THISTLE MINE/TAILINGS
PA NUMBER: 29-073

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	434.329
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		5
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	5.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	868658
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	456.256
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	12
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	3832550
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.908
29	AIR - TARGETS	POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	1
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	143
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.816
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	545
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**47.02**

SITE NAME: THISTLE MINE/TAILINGS
PA NUMBER: 29-073

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	400
3		OPEN ADITS	50 EA.	300
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	700
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**28.00**

29-073, #28: Exploration hole #14

29-073, #29: Exploration hole #15

29-073, #30: Shaft #12

29-073, #31: WR-15

29-073, #33: WR-12

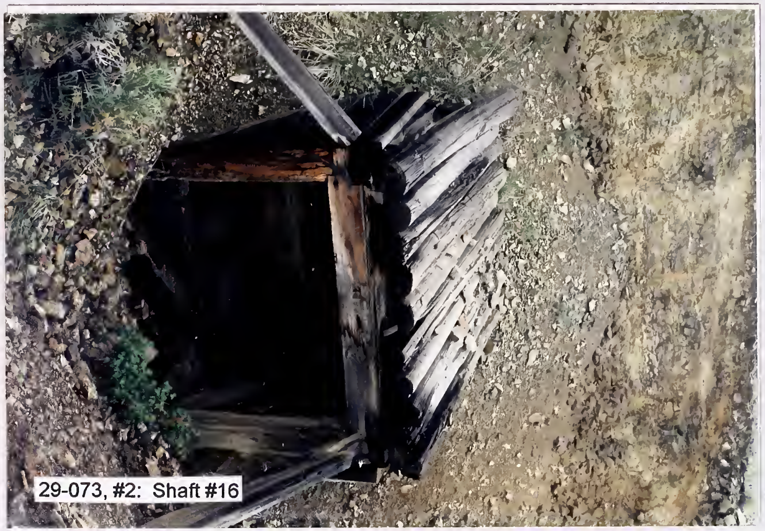
29-073, #35: WR-13

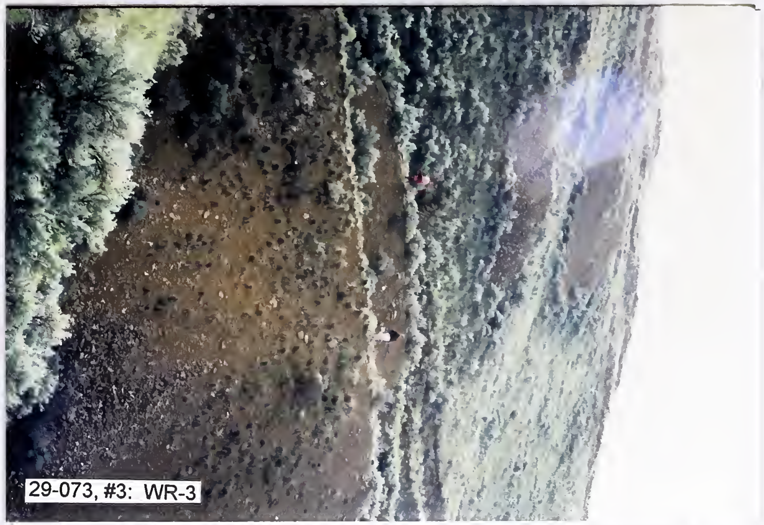
29-073, #32: WR-14

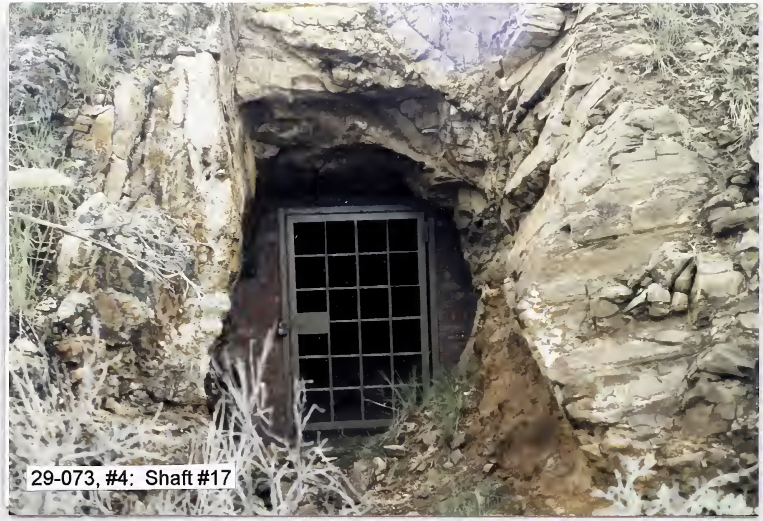
29-073, #34: Collapsed adit for WR-13

29-073, #36: WR-1

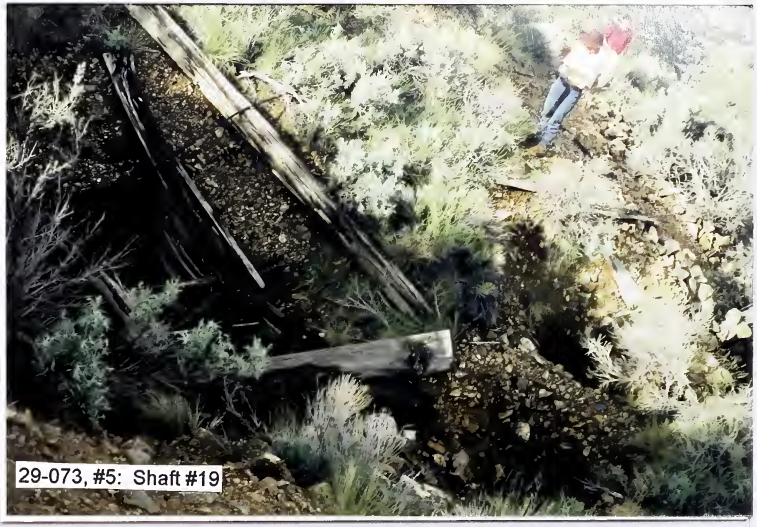
29-073, #37: WR-1


29-073, #2: Shaft #16


29-073, #3: WR-3



29-073, #4: Shaft #17



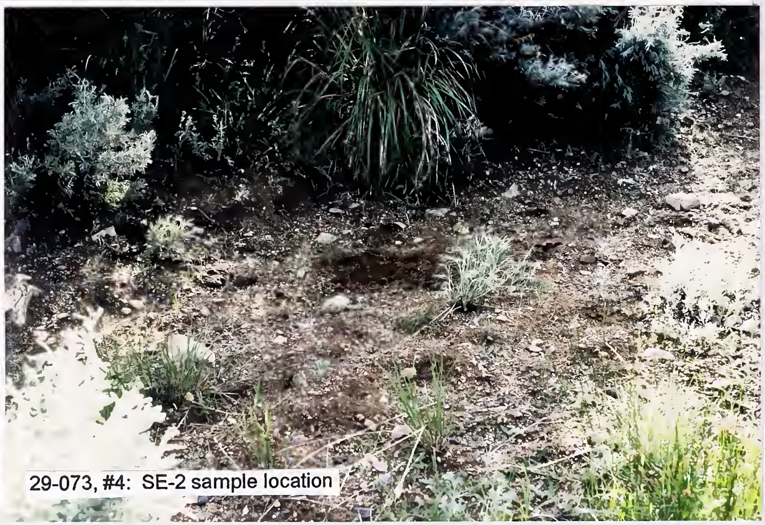
29-073, #5: Shaft #19

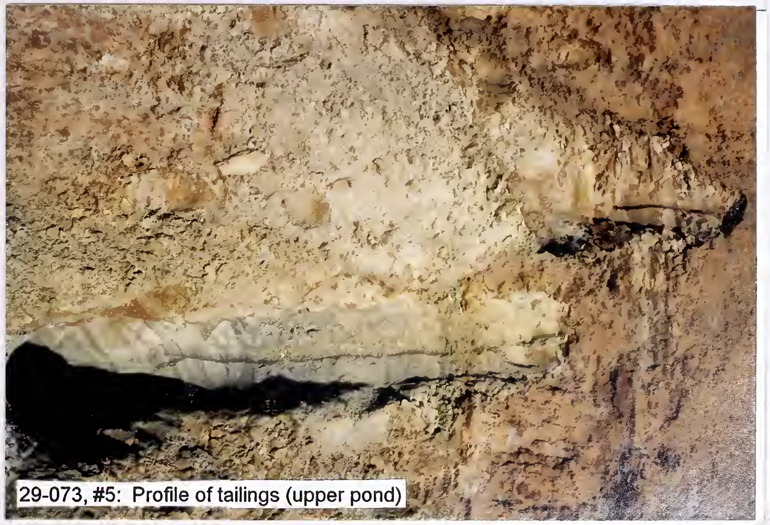
29-073, #6: Adit #20

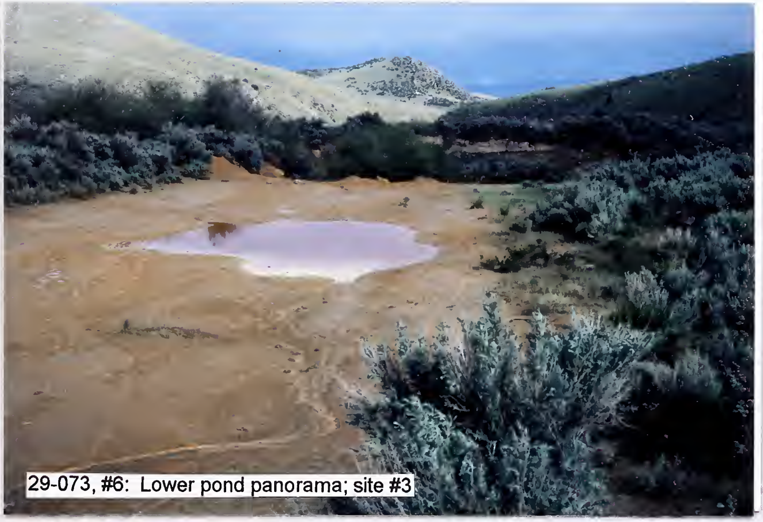
29-073, #1: SE-1 sample location

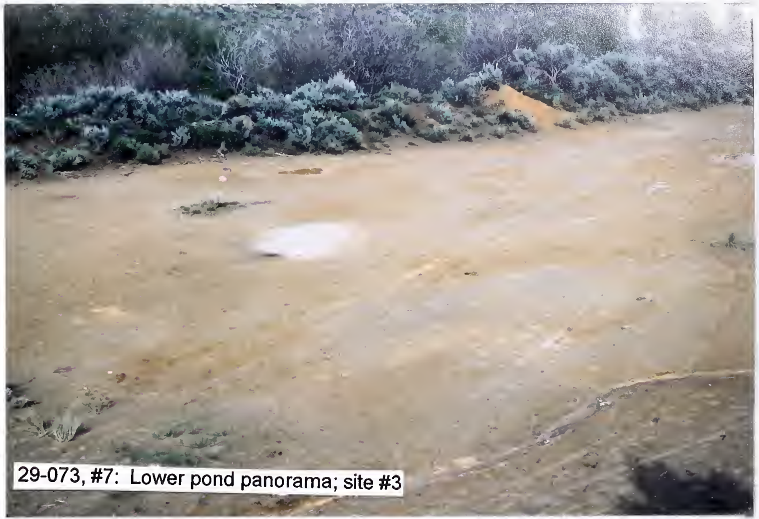
29-073, #2: Tailings location entering creek by road

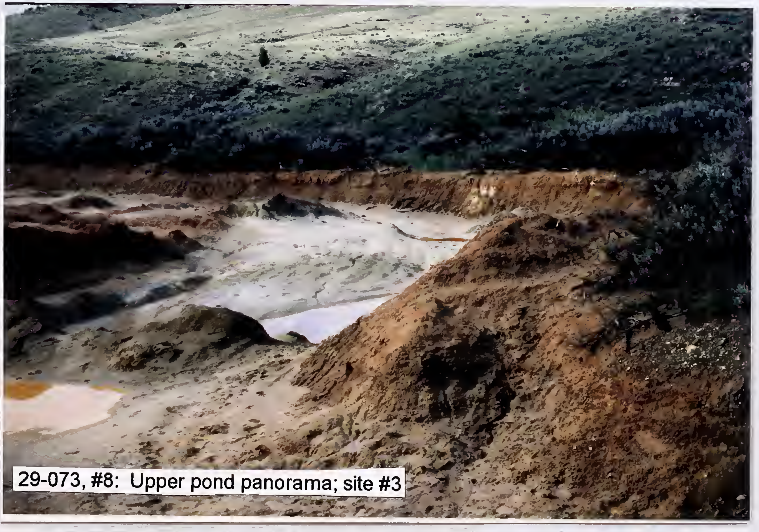
29-073, #3: Tailings location (middle)

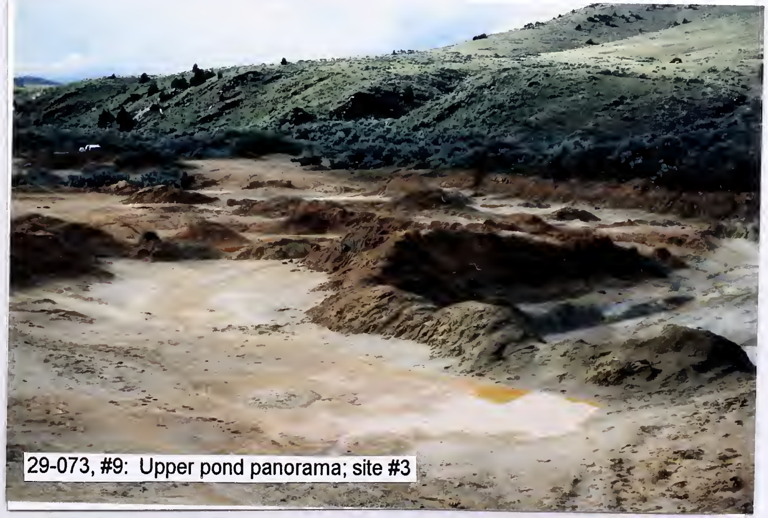

29-073, #4: SE-2 sample location


29-073, #5: Profile of tailings (upper pond)


29-073, #6: Lower pond panorama; site #3


29-073, #7: Lower pond panorama; site #3


29-073, #8: Upper pond panorama; site #3


29-073, #9: Upper pond panorama; site #3

29-073, #10: Upper pond panorama; site #3

29-073, #11: Downstream sediment location

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: WATSECA **PA#:** 29-075

Date: September 20, 1993 **Time:** 0830-1030

Field Team Leader: Bullock, Pioneer

Sampling Personnel: Tuesday, Pioneer
Flammang, Pioneer

Visitors: None

Weather/Seasonality Observations: Clear; calm; 50°F.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #26,#27: Mill.
Video Tape No. 6

General Comments/Observations (not covered specifically in attached Inventory Forms): Active cyanide vat leach operation currently reprocessing old tailings (Thistle No. 1, PA# 29-073) and waste rock from shafts above the mill area. Operation is on 480 acres of patented ground with many other unpatented claims filed on the adjacent ground. Mill supervisor would not volunteer his name and we are to refer all questions to Bob Lee, Chicago Mining in Spokane. Operation appears to recycle water. Storm water erosion control is inplace (straw bale barriers).

Other Hazardous Materials/Substances Present: Cyanide storage and blending diesel fuel; swelling barrel of unknowns. Tanks and barrels are in the open and do not have any secondary containment.

General Comments on Potential Remedial Alternatives: Evaluate when the facility closes.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): WATSECA PA#: 29-075

Legal Description: T 2S ;R 7W ;Sec. 32 , SW1/4 NW1/4 1/4
Sec. 31 , NE1/4 SE1/4 1/4

County: MADISON Mining District: ROCHESTER

Latitude: N 45° 37' 15" Longitude: W 112° 30' 15"

Primary Drainage Basin and Code: Big Hole River/10020004
Secondary Drainage Basin: Rochester Creek

USGS Quadrangle map name(s): Nez Perce Hollow

Mine Type/Commodities: Hardrock/Gold, Silver, Copper, Zinc

Activity Status: Active X ,Inactive/Exploration ___,Abandoned ___.

Ownership status: Known YX N ___; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Rocky Mountain Minerals, Inc., P.O. Box 4344, Prescott, AZ 86302.

Relationship to other mines/sites in the area/district: Many mines are located in the area. Tailings were investigated by Pioneer under the Thistle site (29-073).

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Small miner exclusion; MDSL/AMRB grates have been placed on all but one of the HMO's.

General site features: Elevation 5800' , Slope 0-10° ,
Aspect Western

Land use: Mining ___, Recreational X , Residential ___, Urban ___,
Agricultural X , Other(Specify) ___

Area of disturbed/unvegetated lands? 5 acres.
Dimensions: ___

Predominant vegetation types: Sage brush, rabbit brush, blue bunch wheat grass

Access: roads - good X ,poor ___,4wd ___,trail ___.
Other logistical considerations (proximity to other sites). Site along right (E) side of road, opposite Watseca Mill.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The vein is in schist associated with granite sills.

Mining/milling history, ore type/tenor, host rock, gangue: Possible source of much of the Thistle tailings. The mine was discovered in the 1860's and production began in 1867, operating continuously until 1905. Water was encountered at shallow depths and required pumping. The Watseca vein was reported to have consisted of whitish greasy quartz, porous or spongy limonite, hard compact dark brown limonite, and serricite. Visible free gold was reported in the quartz and limonite. Some disseminated and massive sulfides were also reported in the dumps.

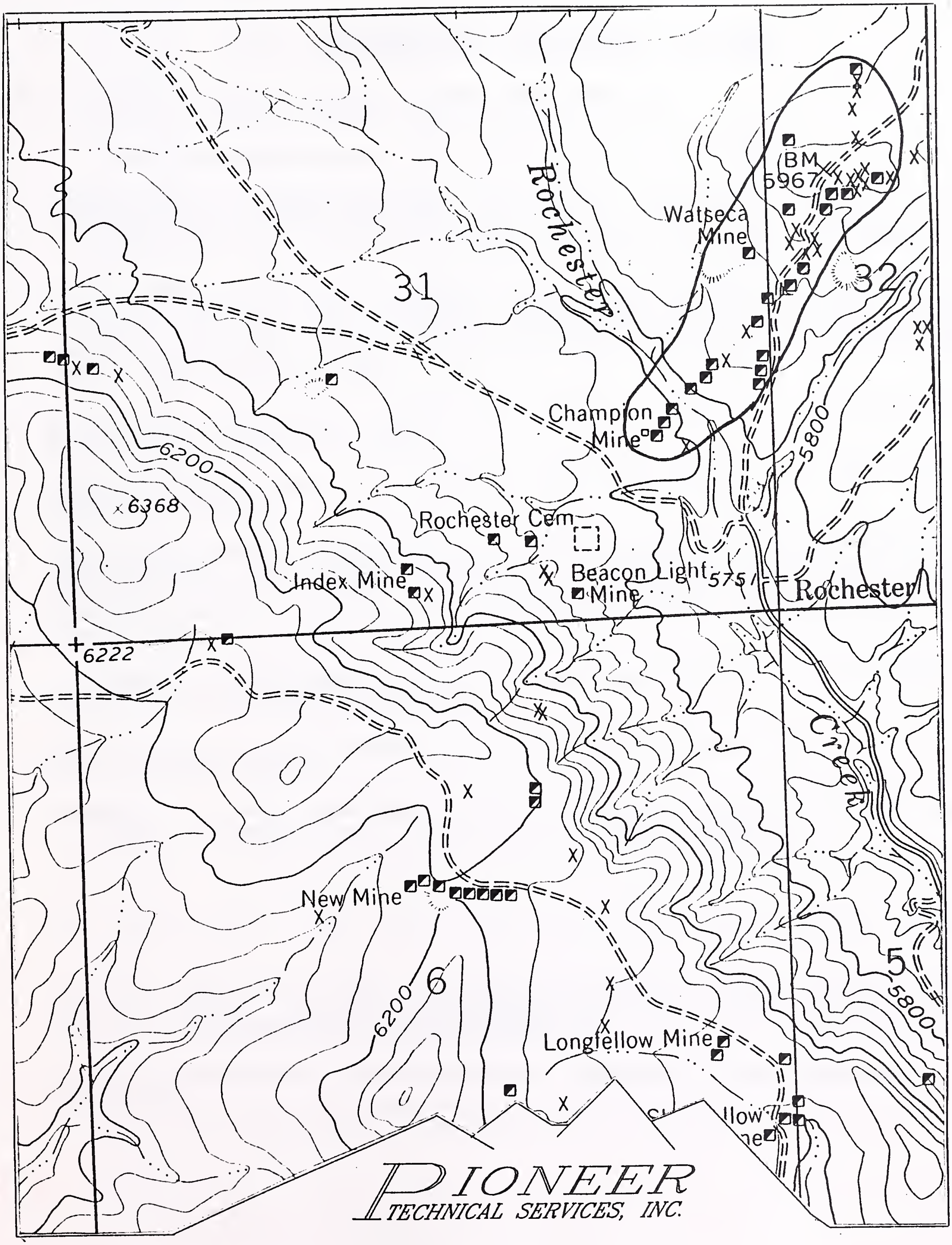
Mine Operation?
Shafts - Yes X, No ___, # 11, Comment All grated, but one
Adits - Yes ___, No X, # ___, Comment
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes X, No ___. If yes answer the next three questions:

Period(s) of Operation: Currently operating; historical milling occurred at the Thistle Mill

Origin of Ore Milled - Custom Mill ___ Dedicated Mill X; Number and names of mines that supplied mill feed: Reworking waste dump material from the Watseca mines and the Thistle tailings.

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
CN- vat leach



PIONEER
TECHNICAL SERVICES, INC.

WATSECA, P.A. NO. 29-075

T02S, R07W, SECTION 32

SCALE: 1" = 1000'

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Fine to medium sand

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Not determined

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Wet

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Tailings impoundment is lined with geotextile and currently appears to be in good condition.

Comments on potential for mitigation: Depends on post-operation conditions.

SOURCE INVENTORY FORM

SAMPLERS: ______________________________

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.									

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: ______________________________

____

____

____

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 5

Distance to nearest well used for drinking? Approx. 2 miles upgradient

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Tailings impoundment liner may leak, reagent spills could have/may occur.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No____, Name(s): Rochester Creek

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No____ Source ID(s):

Approximate Flood frequency? ___ 1 yr, X 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? Dry during investigation
High Flow: 1 cfs , Average Flow: 0 cfs

Distance between waste source(s) and nearest surface water body (ft)?
Approx. 100 feet

Surface water draining onto or through waste sources: Yes____, No X ,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Stock watering, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes X ,
No____, Distance downstream (ft)? 1/2 mi Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Thistle Tailings are in drainage approx. 1/2 mile below the Watseca.

SURFACE WATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 30 to 40 acres

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Limonite

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? On the site

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: ______

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
Not evaluated.						

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_X_, No____, Describe: Approx. 10 employees at the mill.

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes_X_, No___, Describe: Off-road vehicle tracks

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment____
Wilderness Area - Yes___, No_X_, Comment____
T&E Species Habitat - Yes___, No_X_, Comment____
Bat Habitat - Yes___, No_X_, Comment____

Primary Drainage___; Secondary Drainage___; No Information_X_:

Riparian Habitat Quality - High___, Medium___, Low___
Wetlands Frontage - High___, Medium___, Low___
Fisheries Habitat and Species Classification - ___
Sport Fishery Classification - ___

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Most shafts have MDSL/AMRB grates; one is not grated and is approx. 40 feet deep.

Hazardous structures: Yes_X_, No___, Number_1_, types and locations: Operating mill structure

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_1_, types and locations: Integrity of tailings impoundment is questionable.

Fire and/or Explosion hazards: Yes_X_, No____, Explain: Fuel an reagents on-site

Bibliography

MBMG, Mineral Industry File 90.0, Watseca Mine, Madison County.

MBMG, Watseca Mine, Madison County, Form 39, 1976-1987.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Portal Inventory for the Watseca Mill Complex, Prepared by Daphne Digrindakis, June 27, 1985.

USGS, Topographic Map, Nez Perce Hollow, Montana, 7 1/2 minute Quadrangle, 1961.

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

WATSECA
PA NO. 29-075

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: WATSECA
PA NUMBER: 29-075

LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		10
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	100
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	100
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		5
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	5.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	0
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		3
18		WETLANDS		0
19		FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	5
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	0
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		1
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	20
27		LIKELIHOOD SCORE	LINES 25 + 26C	20
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
29	AIR - TARGETS	POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		10
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	21
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	0
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	400
38		LIKELIHOOD SCORE	LINES 36 + 37C	400
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	13
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**0.00**

			SITE NAME:	WATSECA
LINE NO.		**SITE SAFETY**	PA NUMBER:	29-075
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	40
6		EXPLOSIVES		50
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	290
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	13
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**75.40**

29-075, #26: Mill (overview)

29-075, #27: Mill (overview)

SHERIDAN

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SMUGGLER **PA#:** 29-010

Date: June 16, 1993 **Time:** 1420

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Babits, Belanger, Lasher,
Clark; Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Rain on and off; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #17: WR-1, facing north; #18: WR-1, facing southeast; #19: Caved Adit #1, facing north; #20: Caved Adit #2, facing east; #21: WR-2, facing north; #22: Caved Adit #3, facing north; #23: WR-3, facing east; #24: Tailings and panorama, facing southeast. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Access to site by truck. Site is mostly HMOs. Dumps are relatively small and low in metals (XRF). Adit discharges to dump, but then to marshy area. Discovered small tailings pond at town site; mostly revegetated. Additional adit found by Tuesday and Pierson located above site.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Recontour and revegetate dumps; close adit; redirect small discharge to avoid dump; stabilize tailings banks (already well vegetated).

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SMUGGLER PA#: 29-010

Legal Description: T 4S ;R 4W ;Sec. 13 ,SE 1/4SW 1/4SW 1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 28' 57" Longitude: W 112° 02' 18"

Primary Drainage Basin and Code: Mill Creek/10020003
Secondary Drainage Basin: Mill Creek

USGS Quadrangle map name(s): Copper Mountain

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact (Include address and phone when available): BLM; Beaverhead National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7000' , Slope 5°-25° ,
Aspect South

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 1.2 acres.
Dimensions:

Predominant vegetation types: Aspen, fir

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). Off of Mill Creek Road which is access for several mines including the Broadgauge.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 3 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The vein cuts beds of the Cherry Creek Series (interbedded quartzites and limestones) which strike N. 20°E, and dip 70° to the W. The mine site lies on the hillside north of the perennial Mill Creek. The tailings lie in the valley on the north side of Mill Creek and the Mill Creek Road. Water flowing off site would flow south to creek and the Mill Creek flows west away from the site. Approximately 7 miles below the site, Mill Creek meets the Ruby River which flows northwest out of Sheridan.

Mining/milling history, ore type/tenor, host rock, gangue: Oxidized ore was milled on the property. Vein deposit was most likely quartz gangue with auriferous pyrite. No other information available.

Mine Operation?

Shafts - Yes___, No X , # ____, Comment

Adits - Yes X , No___, # 4 , Comment 3 caved; 1 open

Pits - Yes___, No X , # ____, Comment

Placers - Yes___, No X , # ____, Comment

Other - Yes___, No X , # ____, Comment

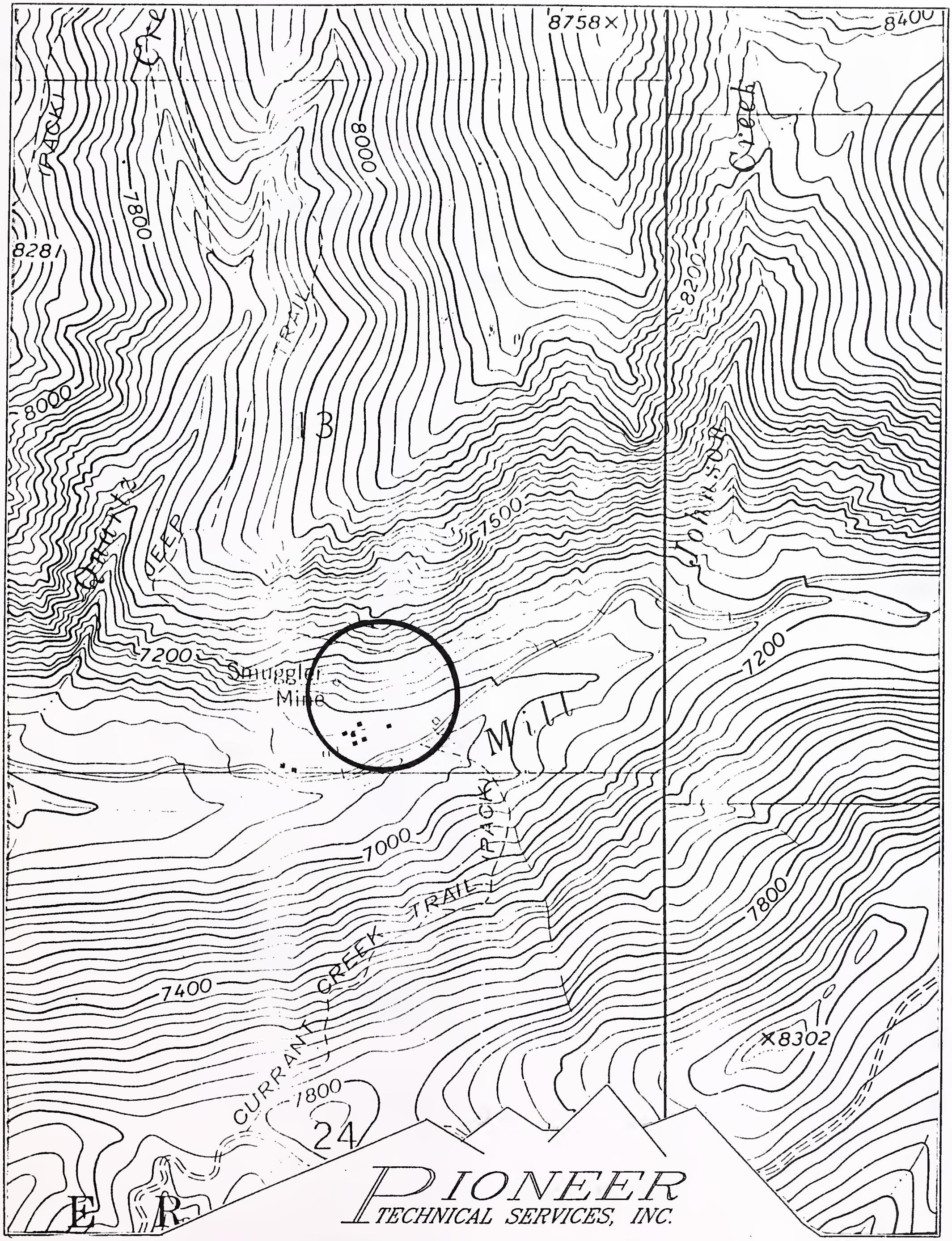
Mill Operation? Yes X , No___. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown; small tailings that were found are uniform, probably local ores.

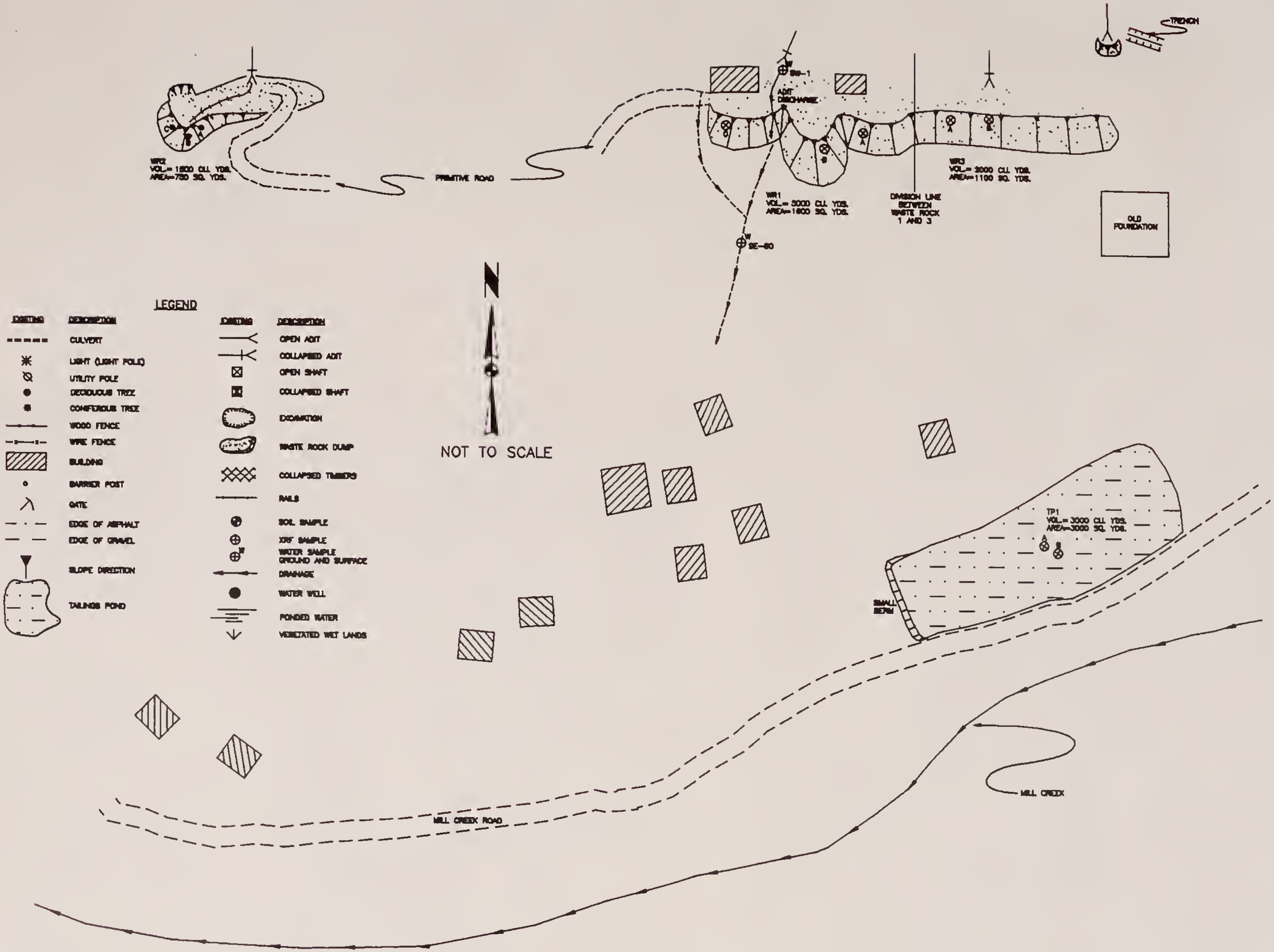
Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting? Possibly floatation; no information available.

Well No.	Location	Depth	Yield	Static Water Level
M:126654	04S 04W 13 DC	260.0	10.0	40.00
M:107812	04S 04W 23 B	46.0	8.0	14.00
M:107811	04S 04W 23 B	42.0	10.0	8.00



PIONEER
TECHNICAL SERVICES, INC.

SMUGGLER, P.A. NO. 29-010
T04S, R04W, SECTION 13
SCALE: 1" = 1000'



DRAWN JTP DATE 29 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED MJB F.B. NO.

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

SMUGGLER PA# 29-010
SHERIDAN DISTRICT MADISON COUNTY

SHEET NO.

29-010.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. **TAILINGS IMPOUNDMENTS** - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 18" of yellow/red silt/clay tailings overlain by 18" sandy brown/red

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): Depth from 5 feet at west end, to 3 feet in center, and 0 feet at the east end.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Revegetation is approximately 80%.

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): No containment

Comments on potential for mitigation: Self mitigated; with some assistance, revegetation could be 100%. Need containment on side facing Mill Creek Road.

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd³)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	5,000	Associated with caved Adit #1; east lobe on south knob	None	5.8 (D)	0.025	29-010-WR-1	06/16/93 1530	T-Metals, ABA
WR-1B	WR		Associated with caved Adit #1; center lobe south end off knob	None	5.6 (D)	0.045			
WR-1C	WR		Associated with caved Adit #1; west lobe on southeast side off knob	None	6.8 (D)	0.05			
WR-2A	WR	1,500	Associated with open Adit #2; east side 1/2 way down	None	6.8 (D)	0.035	N/A	N/A	XRF Analysis
WR-2B	WR		Associated with open Adit #2; west side of large lobe near tracks	None	5.5 (D)	0.035	N/A	N/A	XRF Analysis
WR-2C	WR		Associated with open Adit #2; small west lobe on south face 1/2 way down	None	6.0 (D)	0.035	N/A	N/A	XRF Analysis
WR-3A	WR	2,000	Associated with caved Adit #3; east side near top	None	6.0 (D)	0.04			
WR-3B	WR		Associated with caved Adit #3; west side near top	None	4.8 (D)	0.05			
TP-1A	TAIL	3,000	Just northwest of TP-1B; 18"-36", clayey	None	6.0 (D)	0.03	29-010-TP-1	06/16/93 1700	T-Metals, ABA
TP-1B	TAIL		Just north of road on east end of pond; 0-18", deep sandy	None	6.8 (D)	0.03			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-010-WR-1 is composite of WR-1A through -1C, and WR-3A and -3B. 29-010-TP-1 is composite of TP-1A and -1B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No ___, Number: 1 Identification: Adit #1

Filled shafts: Yes ___, No X , Number: ____ Identification: ________

Seeps/Springs: Yes ___, No X , Number: ____ Identification: ________

Groundwater wells within 4 miles?: Yes X , No ___;
Number of well logs: 13

Distance to nearest well used for drinking? There may be a well at a campground located 1.5 miles east of the site.

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Tailings are above the water table, but may impact; metal values are slightly elevated.

Other observations/notes: Nearest residence is located 4 miles west at a ranch on Mill Creek east of Brandon.

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	AD	Adit discharge	< 1 gpm (E)	6.86	326	113	5.7	181	N/A	29-010-SW-1	06/16/93 1510	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Mill Creek is 200 yds from adits and 20 yds from tailings.

Dry streambeds: Yes ___, No X, Name(s):

Other surface water: Yes X, No ___, Name(s)/Description: Discharge from Adit #1 disappears into a hillside, but follows a swale toward Mill Creek.

Waste materials within any floodplain: Yes ___, No X Source ID(s):

Approximate Flood frequency? ___1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow: ___, Average Flow: ___

Distance between waste source(s) and nearest surface water body (ft)?
60 feet from TP-1 to Mill Creek.

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Adit discharge onto WR-1 then into the ground.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, cattle watering; Ruby River has irrigation, agriculture, wetlands, fishery, and recreation.

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X, Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-50	SE	500 feet from adit discharge toward Mill Creek in swale	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approximately 5

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe:

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100 X ; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 4 miles to a ranch

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Babits, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	FEOX	Dry	14,400	10,800	Yes	Low
WR-2	FEOX	Dry	6,750	6,075	Yes	Low
WR-3	FEOX	Dry	9,900	990	Yes	Low
TP-1	None	Dry	27,000	Approx. 7,000	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:______________________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments______________________________

Evidence of recreational use on site: Yes_X_, No___, Describe: Litter; campfire rings; gunshells

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment__________
Wilderness Area - Yes___, No_X_, Comment__________
T&E Species Habitat - Yes___, No_X_, Comment__________
Bat Habitat - Yes___, No_X_, Comment__________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations: Adit #4 is open.

Hazardous structures: Yes___, No_X_, Number____, types and locations: Several "cabins" in old town site in relatively good condition.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:______________________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_4_, types and locations: Tailings impoundment next to road; waste piles at angle of repose.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:__________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Smuggler mine, Prepared by Chen-Northern, August 8, 1989.

USGS, Mining Districts of the Dillon Quadrangle, Montana and Adjacent Areas, Bulletin No. 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Copper Mountain, Montana, 7 1/2 minute Quadrangle, 1963.

LABORATORY ANALYTICAL DATA

SMUGGLER
PA NO. 29-010

Smuggler PA# 29-010
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 06/16/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-010-TP-1	36	14.8	3.9 J	14.8	30.2	58.4	25700	2.51	703	41	504	4 UJ	435	NR
29-010-WR-1	29	26.1	6.6	22.9	74.6	71.7	37100	0.207 J	1220	78	514	3 UJ	1030	NR
BACKGROUND	20	96.4	1.2 JX	20.2	42.1	35.1	18200	0.017 U	608	59	25	4 UJ	61	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-010-TP-1	0.07	2.19	49.2	47	0.01	0.02	0.04	0.62	48.6
29-010-WR-1	0.31	9.68	115	105	<0.01	0.14	0.24	4.37	111

Cation Exchange Capacity

FIELD ID	milliequivalents/100g
29-010-TP-1	2.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-010-SW-1	1.69 U	7.13	2.55 U	5.99 U	5 U	1.93 J	46.2	0.26	2.6 U	10.5 J	1.55 U	18.3 U	19.6	186

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-010-SW-1	234	< 5.0	19	0.13	NR

LEGEND

TP1 - Composite of the subsamples TP1A and 1B.
WR1 - Composite of the subsamples WR1A through 1C, and 3A, and 3B.
BACKGROUND - From the Uncle Sam Mine (29-383-SS-1).
SW1 - Adit discharge.

XRF ANALYSIS RESULTS

SMUGGLER
PA NO. 29-010

MDSL AMRB/PIONEER 4/9/93

Mine Name: Smuggler PA# 29-010
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-010-SE-50		26912.1	38724.4	2345.61	231.259 *	983.596 *	37328.8			369.218 *		131.141
29-010-TP1-A		21068.3	13684	1478.27	169.253 *		21714.5			293.059		85.2417
29-010-TP1-B		15703.1	16012.5	1060.2	140.001 *	402.034 *	24799.5			346.992		65.0539
29-010-TP-1-COMP		18698.5	12642.7	1597.48			25039.7		50.6843 *	325.32		70.8776
29-010-WR1-A		8668.48	32286.5	1376.57	308.488 *	840.721 *	36520.5		83.403 *	66.4923 *		73.4522
29-010-WR1-B		23812	27834.8	3956.46		879.683 *	52863		73.0558 *	481.478		147.071
29-010-WR1-C	474.294 *	21344.5	57579.7	1594.04	388.702 *	1351.47 *	42469.8			570.442		64.601
29-010-WR2-A		7984.1	25447.9	3777.7		979.562 *	47618.7		86.1305 *	124.739 *		198.714
29-010-WR2-B	421.524 *	41818	10654.8	3923.93		1091.08 *	33790.9			1112.5		57.4088
29-010-WR2-C	503.598 *	10019.2	14565.9	3620.9	227.615 *	955.221 *	55972.6		79.7987 *	89.7615 *		199.56
29-010-WR3-A		17072.2	15704.9	1516.24	196.05 *	986.02 *	38367.8		59.3839 *	3078.97		78.7655
29-010-WR3-B	445.964 *	24259.4	28733.8	2519.94	211.748 *	739.181 *	41547.8		77.6028 *	798.385		118.473
29-010-WR-1-COMP	310.316 *	22490	36203.8	2680.12	153.05 *	981.764 *	46429.6		111.276 *	1112.43		91.6323

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-010-SE-50	46.9254			170.578 *	81.3412 *			254.07	439.49 *		
29-010-TP1-A	105.922			363.877	72.072		46.4972 *	214.599	415.771 *		
29-010-TP1-B	123.164			318.497	64.9932		50.4232 *	169.053	340.828 *		
29-010-TP-1-COMP	112.024			419.659	72.6655		34.5458 *	202.711	326.881 *		
29-010-WR1-A	27.5755			23.4825 *	48.2712			147.582			
29-010-WR1-B	110.487			280.67	57.9214		65.041 *	281.442	714.923 *	18.5196 *	
29-010-WR1-C	36.3124			275.97	107.512		51.8437 *	191.378	492.507 *		
29-010-WR2-A	103.816				27.1818 *		48.1188 *	265.701	376.313 *		
29-010-WR2-B	212.757			430.022	135.505		55.243 *	337.685	515.093 *	15.9077 *	
29-010-WR2-C	115.554				41.9039 *		58.5064 *	243.422	542.3 *		
29-010-WR3-A	63.4631			1002.94	85.0401		39.3418 *	155.069	353.397 *		
29-010-WR3-B	69.4081			318.077	95.8692		75.2627 *	241.922	449.257 *		
29-010-WR-1-COMP	65.1456			492.736	83.3101		65.9368 *	233.121	605.495 *	15.6191 *	

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SMUGGLER
PA NO. 29-010

AIMSS SCORESHEET

SITE NAME: SMUGGLER
PA NUMBER: 29-010

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.182
6		WELLS - 1 MI. x 2.5		7.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		10
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	17.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	22274

SURFACE WATER PATHWAY

11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.569
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	12848

AIR PATHWAY

25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.068
29		POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	40
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	136

DIRECT CONTACT PATHWAY

36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.061
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		10
43		TARGETS SCORE	SUM LINES 40 THRU 42	11
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	101

45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000	**0.35**

SITE NAME: SMUGGLER
PA NUMBER: 29-010

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		10
12		TARGETS SCORE	SUM LINES 9 THRU 11	11
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**11.00**

29-010, #17: WR-1, facing north

29-010, #18: WR-1, facing southeast

29-010, #19: Adit #1, facing north

29-010, #20: Adit #2, facing east

29-010, #21: WR-2, facing north

29-010, #22: Adit #3, facing north

29-010, #23: WR-3, facing east

29-010, #24: TP-1, facing southeast

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: GOLDSCHMIDT/STEINER PA#: 29-078

Date: August 25, 1993 Time: 0900

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Cool (40°F) to warm (65°F); partly cloudy; slight breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #23: Mill building; #24: Area between mill and WR-1 (in background); #25: WR-10 with Currant Creek in foreground. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): A mill was identified as being present on the property during the 1989 inspection; however, no tailings were identified during this 1993 inspection. A location where tailings were possibly deposited was identified and augered. XRF analytical results showed slightly elevated zinc and lead values. This is not conclusive that the location was tailings; location could be eroded waste rock. No other possible tailings were identified. Claim notice by FMC on-site is dated 1992.

Other Hazardous Materials/Substances Observed: N/A

General Comments on Potential Remedial Alternatives: Close adits and fill subsidences using waste rock; move WR-1, WR-9C, and WR-10 away from stream and out of floodplain.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): GOLDSCHMIDT/STEINER PA#: 29-078

Legal Description: T 4S ;R 4W ;Sec. 25 , NE1/4 SW1/4 ___1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 27' 10" Longitude: W 112° 02' 40"

Primary Drainage Basin and Code: Ramshorn Creek/10020003
Secondary Drainage Basin: Currant Creek

USGS Quadrangle map name(s): Copper Mountain

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Beaverhead National Forest.

Relationship to other mines/sites in the area/district: There are no other mines in the Currant Creek drainage.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 6800' , Slope Up to 30° ,
Aspect Lower half, North; upper half, South

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 2 acres.
Dimensions: There is approx. 1 acre at each of the upper and lower areas.

Predominant vegetation types: Lodgepole pine, aspen, grasses, wild flowers, roses, Douglas fir

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Currant Creek flows northeast to southwest, parallel to the road, and adjacent to the site. The site is underlain by limestone.

Mining/milling history, ore type/tenor, host rock, gangue: Ore is reported to occur in quartz lenses in a strong fissure in limestone. Ore is oxidized with frequent manganese pockets near the ore.

Mine Operation?
Shafts - Yes___, No X, # ___, Comment
Adits - Yes X, No___, # 13, Comment 8 open
Pits - Yes___, No X, # ___, Comment
Placers - Yes___, No X, # ___, Comment
Other - Yes___, No X, # ___, Comment

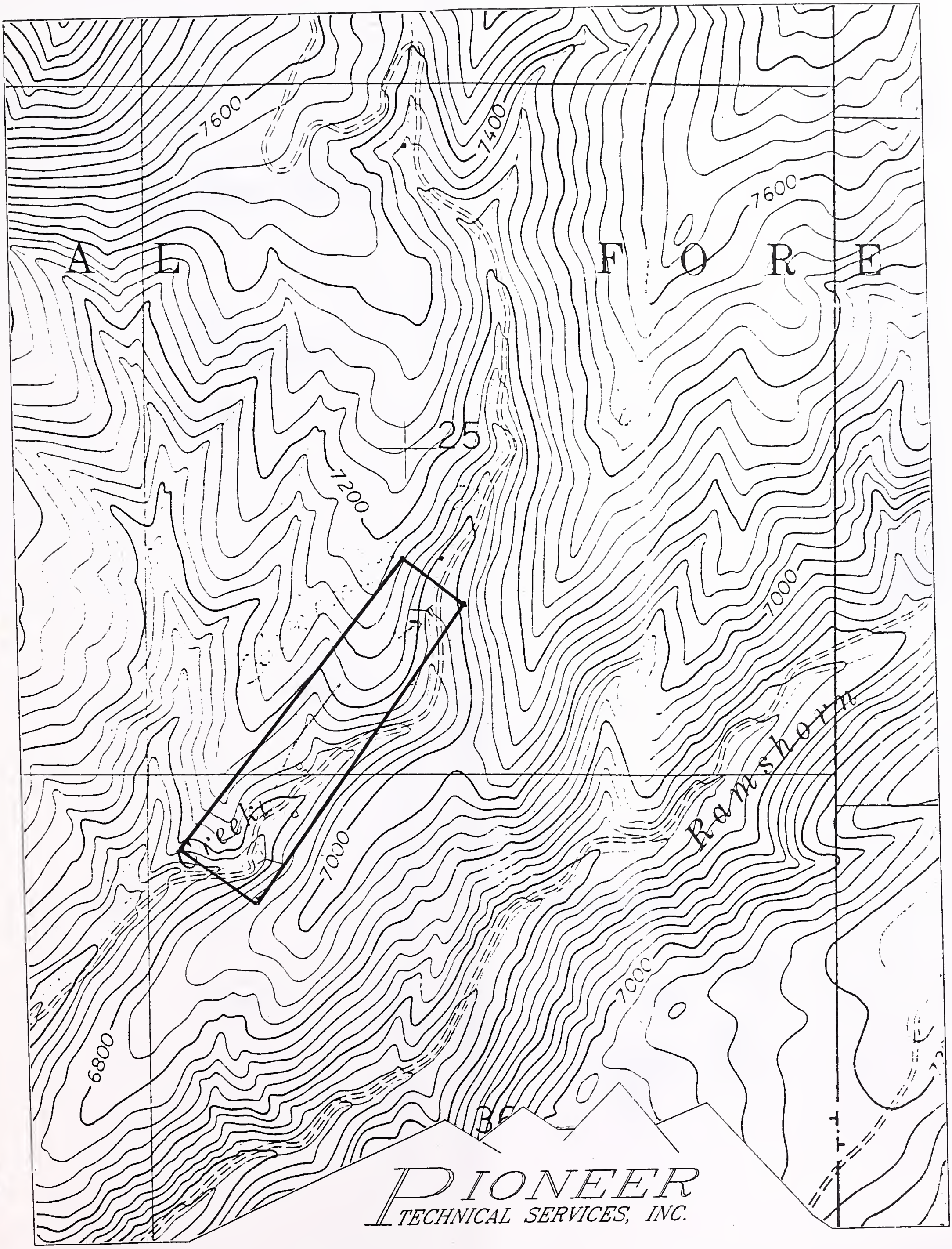
Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill X; Number and names of mines that supplied mill feed: Goldschmidt/Steiner

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? Ore was dumped on a 2' grizzly, then oversize to a 5'x7' crusher. From there, ore went to a 10-stamp straub prospector's mill and over a 35'x90' amalgam plate followed by two 33'x54' blanket tables. Mill capacity was 12-15 tons of oxidized ore in 24 hours.

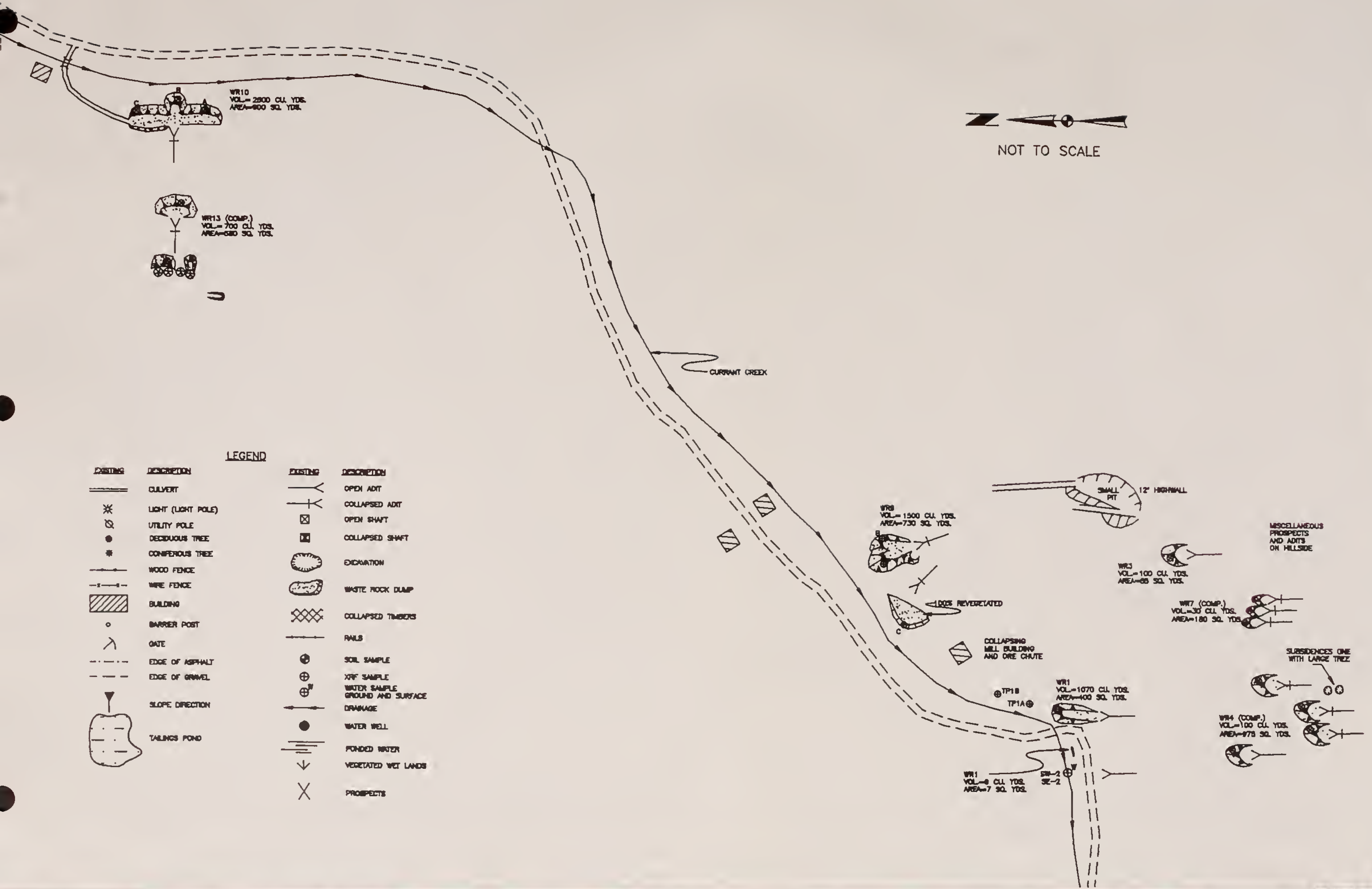
Well No.	Location	Depth	Yield	Static Water Level
M:107812	04S 04W 23 B	46.0	8.0	14.00
M:107811	04S 04W 23 B	42.0	10.0	8.00



GOLDSCHMIDT-STEINER, P.A. NO. 29-078

T04S, R04W, SECTIONS 25, 36

SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN JTP DATE 1 NOV 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

GOLDSCHMIDT-STEINER PA# 29-078
SHERIDAN DISTRICT MADISON COUNTY

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

29-078.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A	TAIL	ND	Just above road crossing; 3"-2'; coarse sand	None	5.7 (D)	0.04	N/A	N/A	XRF Analysis
TP-1B	TAIL		Just above road crossing; 2'-2.5', gray sand	None	4.6 (D)	0.04	N/A	N/A	XRF Analysis
WR-1	WR	1,500	Northeast corner of WR-1; 1' off of top	None	6.8 (D)	0.04	29-078-WR-1	08/25/93 1620	T-Metals, ABA
WR-3	WR	100	Off of knob; approx. 1' down	None	6.8 (D)	0.03	29-078-WR-2	08/25/93 1635	T-Metals, ABA
WR-4	WR	100	Composite of three small dumps located above and below Adit #4	None	6.8 (D)	0.045			
WR-7	WR	30	Off of north nose of dump	None	6.8 (D)	0.03			
WR-9A	WR	1,500	On southwest end of dump; 1' off of knob	None	6.85 (D)	0.04			
WR-9B	WR		On north knob; 1' off of top	None	6.8 (D)	0.04			
WR-9C	WR		Knob on south end approx. 5' up from stream	None	6.8 (D)	0.04			
WR-10A	WR	2,500	South end of WR-10; approx. 1' from top	None	6.8 (D)	0.03	29-078-WR-3	08/25/93 1650	T-Metals, ABA
WR-10B	WR		Just below end of track coming from adit	None	6.85 (D)	0.05			
WR-10C	WR		North end of WR; 1' from top	None	6.85 (D)	0.03			
WR-13	WR	700	Composite of three upper dumps; two of which are associated with four prospect pits	None	6.75 (D)	0.03			

* D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-078-WR-1 is composite of WR-1 and WR-9A through -9C. 29-078-WR-2 is composite of WR-3, WR-4, and WR-7. 29-078-WR-3 is composite of WR-10A through -10C and WR-13. ND = Not Determined

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:________

Filled shafts: Yes___, No X , Number:____ Identification:________

Seeps/Springs: Yes___, No X , Number:____ Identification:________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 20

Distance to nearest well used for drinking? 2 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
No groundwater discharge from adits; metal values in most dumps are only slightly elevated; little water associated with site.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No___, Name(s): Currant Creek

Dry streambeds: Yes____, No X, Name(s):

Other surface water: Yes____, No X, Name(s)/Description:

Waste materials within any floodplain: Yes X, No___ Source ID(s): Small portion of WR-1 on west side of road is in creek, and WR-1 on east side of road along with WR-9C is in floodplain; WR-10 in Currant Creek.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? 0.5 during investigation
High Flow: 0.75 cfs, Average Flow: 8 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; toe of WR-1 (west side of road) and WR-10 in stream.

Surface water draining onto or through waste sources: Yes____, No X,
Describe: Only runoff

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, irrigation, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	250′ upgradient from cabin in Currant Creek	7.63	155	211	7.9	68	0.5 cfs (M)	29-078-SW-1	08/25/93 1220	T-Metals, TDS, Hardness, SO4, Cl, NO2/NO3
SE-1	SE	250′ upgradient from cabin in Currant Creek	N/A	N/A	N/A	N/A	N/A	N/A	29-078-SE-1	08/25/93 1220	T-Metals
SW-2	SW	100′ downgradient from WR-1 in Currant Creek	8.08	163	258	7.2	79	0.5 cfs (M)	29-078-SW-2	08/25/93 1025	T-Metals, TDS, Hardness, SO4, Cl, NO2/NO3
SE-2	SE	100′ downgradient from WR-1 in Currant Creek	N/A	N/A	N/A	N/A	N/A	N/A	29-078-SE-2	08/25/93 1025	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
$pH \leq 5.0$	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes X , No ___, Describe: Streamside only

Carbonate rocks/soils: Yes X , No ___, Describe: Vein reported to be in limestone; limestone identified in float along road.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Flammang, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	None	Dry	3,663	2,564	Yes	Low
WR-3	None	Dry	585	146	Yes	None
WR-4	Small amount SO3	Dry	8,775	4,387	Yes	None
WR-7	None	Dry	1,620	405	Yes	None
WR-9A, -9B	Veg	Dry	4,000	3,600	Yes	Low
WR-9C	None	Dry	2,570	0	Yes	None
WR-10	Small amount SO3	Dry	8,100	6,480	Yes	Low
WR-13	None	Dry	5,220	2,610	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes_X_, No___, Describe: Beer cans

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______
Wilderness Area - Yes___, No_X_, Comment______
T&E Species Habitat - Yes___, No_X_, Comment______
Bat Habitat - Yes_X_, No___, Comment Open adits

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_8_, types and locations: All adits: one on road with no dump; one associated with WR-1; one associated with WR-3; two associated with WR-4; two associated with WR-7; and, one associated with WR-10.

Hazardous structures: Yes_X_, No___, Number_4_, types and locations: Mill and three cabins

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:______

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______

Fire and/or Explosion hazards: Yes_X_, No___, Explain: Wood mill building and cabins

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Goldshmidt/Steiner, Prepared by Chen-Northern, July 8, 1989.

USBM, Gold Lode Mining in the Tobacco Root Mountains, Madison County, Montana, Information Circular 6972, Written by S.H. Lorain, November 1937.

USGS, Topographic Map, Copper Mountain, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

GOLDSCHMIDT/STEINER
PA NO. 29-078

MDSL AMRB/PIONEER 4/9/93

Goldschmidt–Steiner PA# 29–078
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 08/25/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29–078–SE–1	7.52 U	129 J	1.4 U	10.3	60.2	20	15000	0.053 U	481	29.6 J	10.3 U	9.95 UJ	67.6	NR
29–078–SE–2	14.7	535 J	1.6	46.2	82.7	55.1	25100	0.208 J	2730	101 J	80.1	6.34 UJ	208	NR
29–078–WR–1	32.9	139 J	10.2	37.2	54.1	78.8	27900	0.557 J	3350	100 J	1150	6.98 UJ	953	NR
29–078–WR–2	19.7	228 J	7.79 J	30.8	72.3 JX	57.6	35000	1.01 J	8800 J	191 JX	403 JX	8.53 J	885 J	NR
29–078–WR–3	164	41.7 J	74.90 J	59.9	45.4 JX	112	39700	0.49 J	2390 J	133 JX	1500 JX	37.1 J	8890 J	NR
BACKGROUND	20	96.4	1.2 JX	20.2	42.1	35.1	18200	0.017 U	608	59	25	4 UJ	61	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29–078–WR–1	<0.01	0	21.4	21.4	<0.01	0.01	<0.01	0.31	21.1
29–078–WR–2	<0.01	0	177	177	<0.01	<0.01	0.01	0	177
29–078–WR–3	0.11	3.44	50.1	46.7	0.05	0.01	0.05	0.31	49.8

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29–078–SW–1	0.96 U	42.8	2.57 U	9.7 U	6.83 U	1.55 U	278	0.14 JX	41.4	19.1	4.53 J	30.7 U	10.7 J	59.2
29–078–SW–2	0.96 U	44.1	2.57 U	9.7 U	6.83 U	1.55 U	501	0.2 JX	45	12.7 U	2.86 J	30.7 U	17.4 J	69.4

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
29–078–SW–1	107	< 5.0	< 5	0.33	NR
29–078–SW–2	111	< 5.0	< 5	0.31	NR

LEGEND

SE1 – 250' upgradient from cabin in Current Creek.
SE2 – 100' downgradient from waste rock dump 1 in Current Creek.
WR1 – Composite of subsamples WR1, 9A, 9B, and 9C.
WR2 – Composite of subsamples WR4, 7, and 3.
WR3 – Composite of subsamples WR10A, 10B, 10C, and 13.
BACKGROUND – From Uncle Sam Mine (29–383–SS–1).
SW1 – Same as sample SE1.
SW2 – Same as sample SE2.

XRF ANALYSIS RESULTS

GOLDSCHMIDT/STEINER
PA NO. 29-078

MDSL AMRB/PIONEER 4/9/93

Mine Name: Goldschmidt – Steiner PA# 29 – 078
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29–078–SE–2		21988.1	11607.8	3800.31		3316.82	39215.9		78.4681 *	164.166 *		117.472
29–078–TP1–A		14820.6	13591.5	3312.01	172.87 *	1773.14	39535.4		68.0863 *	199.374		180.191
29–078–TP1–B		13142.1	5787.48	1784.71	143.863 *	2672.52	31570.9		103.136 *	327.046		104.04
29–078–WR10–A		22328.3	9202.27	3907.76		3189.61	66052.2		134.195 *	441.039	82.1393 *	53.8955
29–078–WR10–B		40581.4	2610.81	5744.79		2527.86	27609.3		106.142 *	1728.69		14.2248 *
29–078–WR10–C		37386.7	2575.88	4158.88	199.221 *	4382.65	44424.6		197.349 *	20209.3		11.2227 *
29–078–WR9–A		28529.8	5405.92	4481	162.9 *	2910.03	40033.2		74.7919 *	374.389		27.6334
29–078–WR9–B	310.929 *	23216.5	3263.76	3763.63	197.166 *	906.665 *	47402.2	350.244 *	117.016 *	123.617 *		12.8417 *
29–078–WR9–C		28453.3	8666.01	2965.01		17782.1	66632.1		181.296 *	2442.79		63.9635
29–078–WR–1	472.841 *	24575.5	6772.95	3029.2		15030.8	60818.8		136.812 *	1978.67		32.6006
29–078–WR–13	476.926 *	32888.7	17916.2	4192.97		3747.55	43324.1		138.744 *	5719.81		32.8154
29–078–WR–13–DUP	407.877 *	33724	16827.6	4355.8		4238.69	43985.5		148.589 *	5722.77		35.1642
29–078–WR–1–COMP		35779.6	8382.61	4631.98		10461.1	61882.9		148.518 *	1398.6		45.2218
29–078–WR–2–COMP		22596.8	51375.2	3924.63		10931.1	48040.1		96.978 *	655.652		38.3145
29–078–WR–3		30764.4	6865.92	4660.54		2595.06	48000.9		111.498 *	177.561		30.4316
29–078–WR–3–COMP		32528.6	13518.2	4740.31	197.721 *	3608.68	45434.9		166.94 *	8714.68		23.2996 *
29–078–WR–4		29066.2	9059.33	4664.08		1832.28	40902.2		53.3204 *	95.8476 *		27.2839
29–078–WR–7		1804.31	96133.6			32226.9	48432.7		165.163 *	1959.73		86.7775

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29–078–SE–2	179.846				102.038			436.523			7.12313 *
29–078–TP1–A	164.489				86.5099			349.242	80.5056 *		
29–078–TP1–B	111.612			371.505	72.2047			254.771			
29–078–WR10–A	158.191				112.949			261.331	82.792 *		
29–078–WR10–B	232.21				170.685			189.56	66.6124 *		9.55926 *
29–078–WR10–C	135.761				149.366	300.878 *		136.659	187.401 *		
29–078–WR9–A	157.841				128.424			224.348			
29–078–WR9–B	169.629				114.754			161.538			
29–078–WR9–C	176.726				129.479			414.256	126.624 *		
29–078–WR–1	165.529				105.36			235.426			
29–078–WR–13	170.907				158.177		66.2437 *	243.439	123.583 *		
29–078–WR–13–DUP	169.059				158.395			232.531	105.339 *		
29–078–WR–1–COMP	218.522				162.505			319.995	172.384 *		
29–078–WR–2–COMP	150.347				112.776			261.719			
29–078–WR–3	152.314				160.215			194.374			
29–078–WR–3–COMP	174.449				152.442		53.6366 *	232.108	113.746 *		
29–078–WR–4	154.664				111.592			156.79			
29–078–WR–7	16.6103 *				19.2126 *			430.828			

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

GOLDSCHMIDT-STEINER
PA NO. 29-078

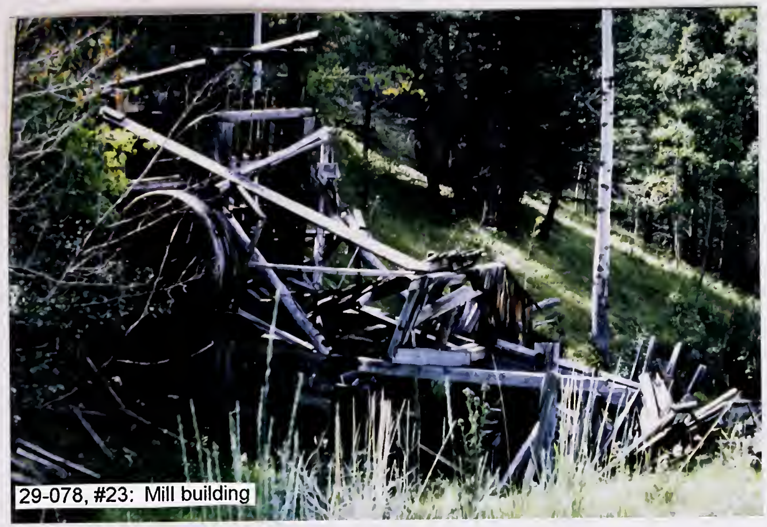
AIMSS SCORESHEET

SITE NAME: GOLDSCHMIDT/STEINER
PA NUMBER: 29-078

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	6.697
6		WELLS - 1 MI. x 2.5		5.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		18
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	23.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	30806
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	7.388
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	87917
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.039
29		POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	39
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.036
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	2
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	11
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**1.19**

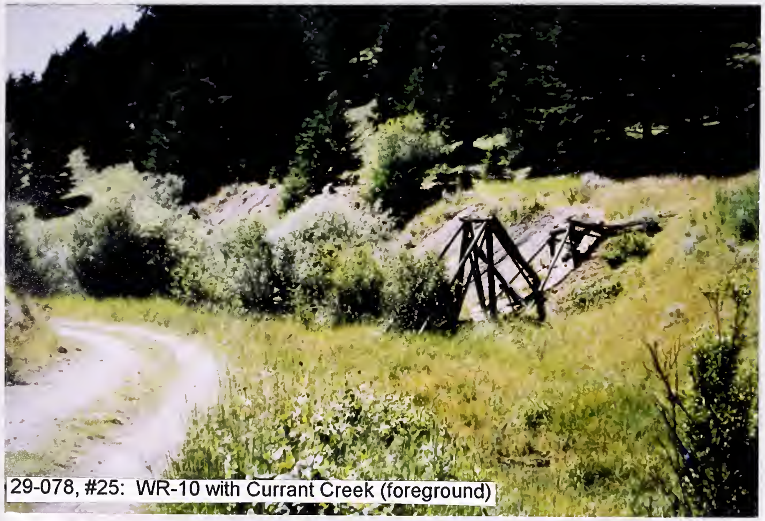
SITE NAME: GOLDSCHMIDT/STEINER
PA NUMBER: 29-078

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	400
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	160
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	560
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	2
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**22.40**



29-078, #23: Mill building

29-078, #24: Downgradient of mill on Currant Creek and WR-1



29-078, #25: WR-10 with Currant Creek (foreground)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: RED PINE PA#: 29-079

Date: August 25, 1993 Time: 1530

Field Team Leader: Babits, Pioneer

Sampling Personnel: Pierson, TD&H
Flammang, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (65°F); sunny to partly cloudy; breezy (10 mph); Cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): No photos were taken. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): Reached site by taking Mill Creek Road to Indian Creek Road, which goes right to the site.

Other Hazardous Materials/Substances Present: With the exception of a few 5 gallon buckets that had oil in them, the rest of the barrels were empty. There were also 4 empty fuel tanks, but they may contain sludge.

General Comments on Potential Remedial Alternatives: Coversoil and revegetate tailings (no significant elevated metals and neutral pHs).

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): RED PINE PA#: 29-079

Legal Description: T 4S ;R 4W ;Sec. 3 , NW1/4 NW1/4 ___1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 31' 20" Longitude: W 112° 05' 05"

Primary Drainage Basin and Code: Indian Creek/10020003
Secondary Drainage Basin: Unnamed Tributary to Indian Creek

USGS Quadrangle map name(s): Noble Peak

Mine Type/Commodities: Hardrock/Gold, Copper

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Beaverhead National Forest.

Relationship to other mines/sites in the area/district: There are no other mines in close proximity on Indian Creek.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 7360'-7480' , Slope 5-15° ,
Aspect South

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 1.8 acres.
Dimensions:

Predominant vegetation types: Forested with Lodgepole pine and Douglas fir

Access: roads - good___,poor___,4wd X ,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site lies on the north side of the perennial Indian Creek. TP-3 is only a few 100 feet from the creek, which flows southwest past the site. Site appears to be underlain by gneiss and marble.

Mining/milling history, ore type/tenor, host rock, gangue: Ore occurs in vein fractures which cross the limestone-gneiss contact. Ore shoots occur in bodies of quartz. Mineralization occurs as chalcopyrite, pyrohotite.

Mine Operation?

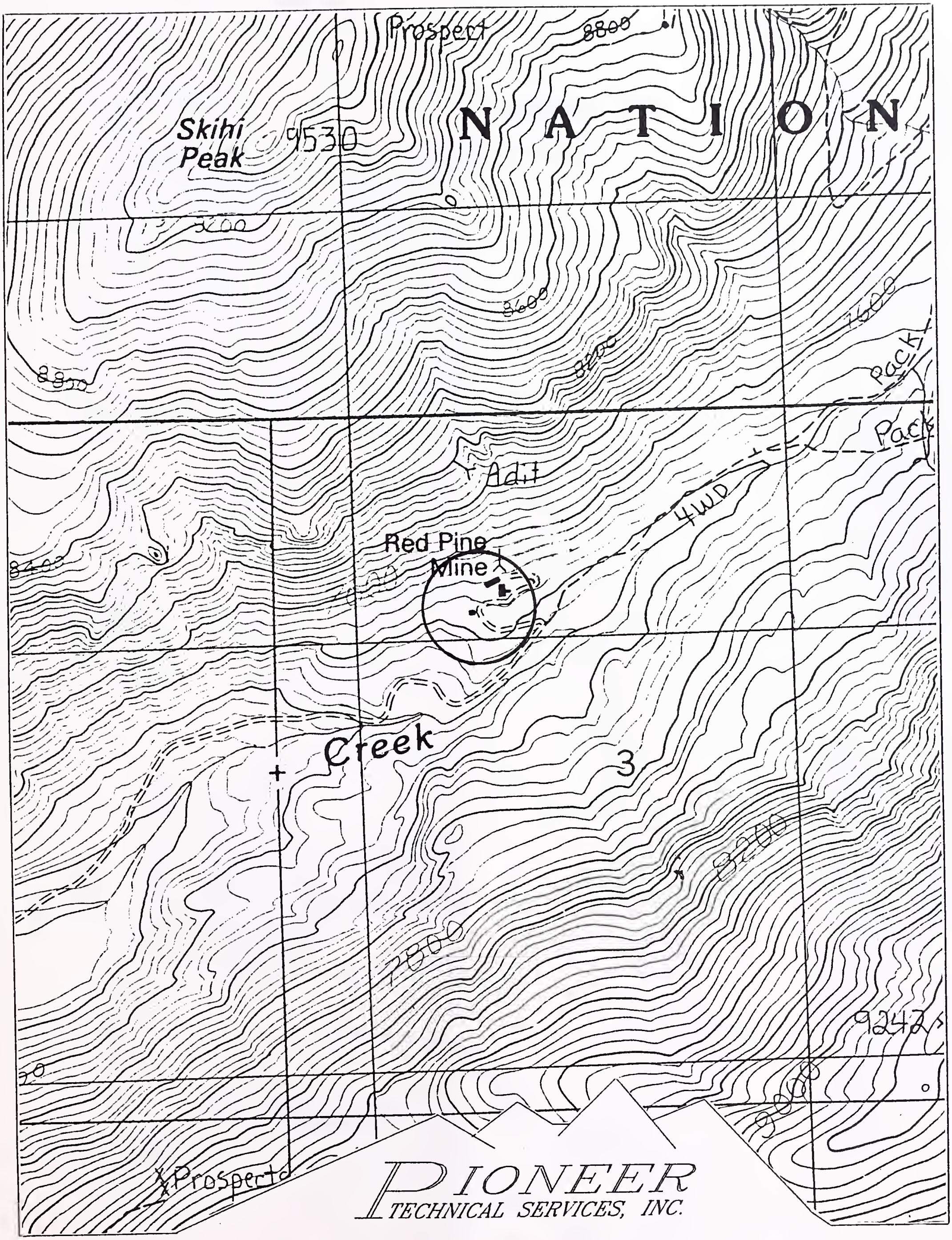
Shafts -	Yes___,	No X,	# ___,	Comment
Adits -	Yes X,	No___,	# 3,	Comment 1 open
Pits -	Yes___,	No X,	# ___,	Comment
Placers -	Yes___,	No X,	# ___,	Comment
Other -	Yes___,	No X,	# ___,	Comment

Mill Operation? Yes X, No___. If yes answer the next three questions:

Period(s) of Operation: Unknown, but operated fairly recently.

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
Unknown

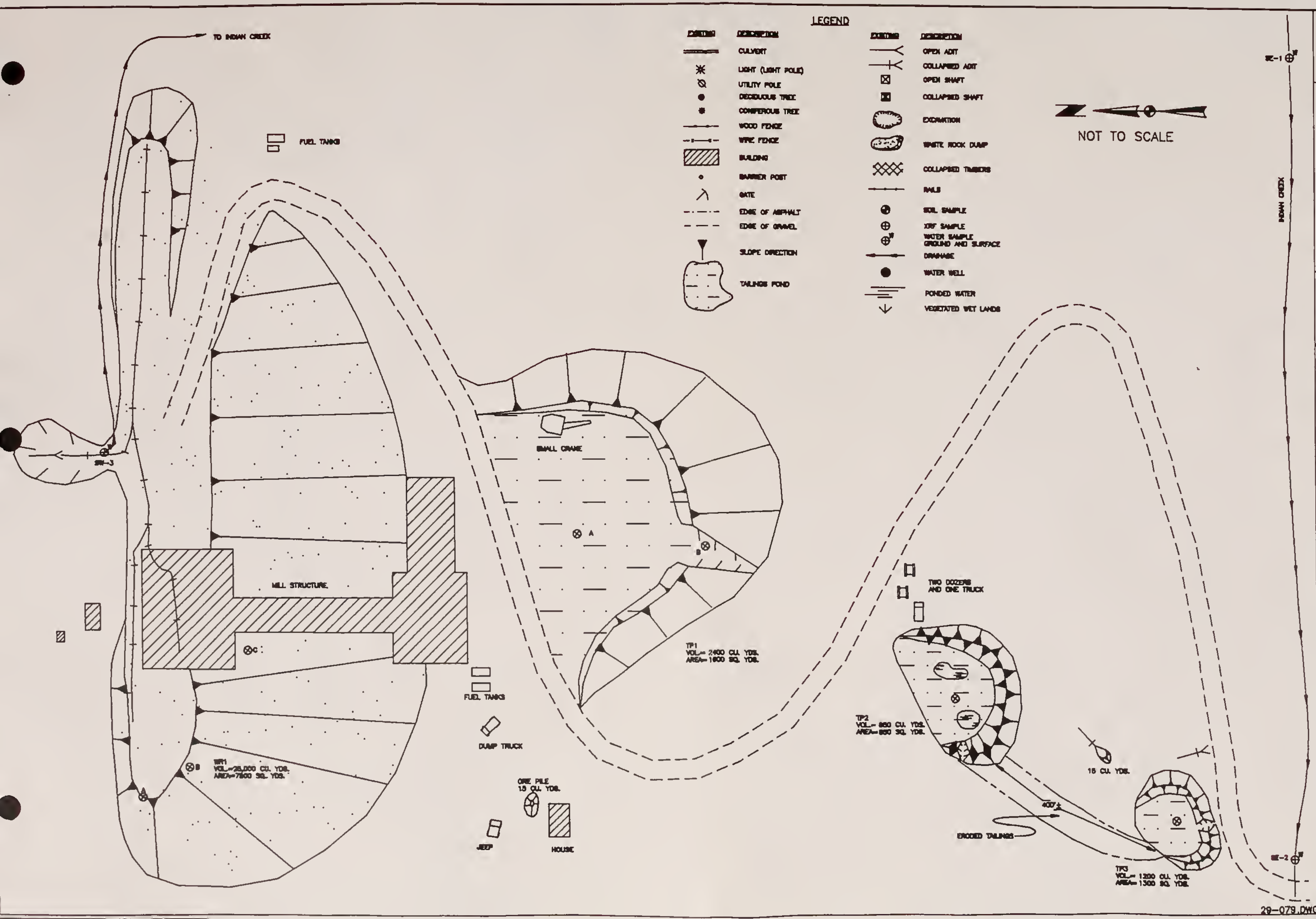


PIONEER TECHNICAL SERVICES, INC.

RED PINE, P.A. NO. 29-079

T04S, R04W, SECTION 03

SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

RED PINE PA# 29-079
SHERIDAN DISTRICT MADISON COUNTY

PIONEER

DRAWN JTP DATE 27 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

TDH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

29-079.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): 80% sand, 20% clay (TP-1 90% sand, 10% clay; TP-2 50% sand, 50% clay; TP-3 80% sand, 20% clay)

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): TP-1 medium brown/red sand, 0-3.5'; gray clay, 3.5-4.5'; dark red brown sand (base of all). All 3 ponds appear to be between 3-4 feet deep with berms deeper; berm on TP-1 was 13 feet deep. All ponds had sand on top, with clay between 2.5-3.5', then red brown sand on bottom.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry (moist, not wet)

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): All 3 tailings impoundments are breached.

Comments on potential for mitigation: Metal values are low, and all 3 ponds show signs of revegetation, with TP-3 almost completely revegetated; contour and seed.

SOURCE INVENTORY FORM

SAMPLERS: Flammang, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAILS	2,400	Northwest part of TP-1; 0-1′, light tan sandy clay	Breached Dam	6.5 (D)	0.02	29-079-TP-2	08/26/93 1000	T-Metals, ABA
TP-1A-B	TAILS		1-3.5′, medium brown sand	Breached Dam	6.4 (D)	0.02			
TP-1A-C	TAILS		3.5-4.5′, gray clay	Breached Dam	6.0 (D)	0.02			
TP-1B-A	TAILS		In east cut of breach; 0-3′, light reddish tan sand	Breached Dam	6.2 (D)	0.03			
TP-1B-B	TAILS		3-3.5′, gray clay	Breached Dam	6.0 (D)	0.04	29-079-TP-2	08/26/93 0950	T-Metals, ABA, CN-
TP-1B-C	TAILS		3.5-7′, red/brown/gray clay	Breached Dam	6.35 (D)	0.035			
TP-1B-D	TAILS		7-10.5′, light tan/gray sand	Breached Dam	6.4 (D)	0.030			
TP-1B-E	TAILS		11-13′, dark red sand	Breached Dam	6.4 (D)	0.03			
TP-2A-A	TAILS	850	Center of TP-2; 6"-2.5′	Breached Dam	6.85 (D)	0.03			
TP-2A-B	TAILS		2.8-3′	Breached Dam	6.4 (D)	0.04			
TP-2A-C	TAILS		3-3.5′	Breached Dam	6.4 (D)	0.04			
TP-2A-D	TAILS		3.5′+	Breached Dam	6.8 (D)	0.03	29-079-TP-3	08/26/93 0935	T-Metals, ABA, CN-
TP-3A	TAILS	1,200	Center of TP-3, lowest pond; 0-1′	Breached Dam	6.9 (D)	0.04			
TP-3B	TAILS		1-1.8′	Breached Dam	6.7 (D)	0.05			
TP-3C	TAILS		1.8-2.8′	Breached Dam	6.7 (D)	0.05			
TP-3D	TAILS		2.8-3′	Breached Dam	4.4 (D)	0.04			
WR-1A	WR	25,000	Approx. 10′ northwest of tracks	None	6.9 (D)	0.045	29-079-WR-1	08/26/93 0930	T-Metals, ABA
WR-1B	WR		Southwest corner of dump	None	6.85 (D)	0.035			
WR-1C	WR		Approx. 15′ east of southwest corner of sheet metal building	None	6.9 (D)	0.045			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-079-TP-1 is composite of TP-1A-A through -1A-C, TP-1B-A, TP-2A-A through -2A-C, and TP-3A through 3C. 29-079-TP-2 is composite of TP-1B-B through -1B-E. 29-079-TP-3 is composite of TP-2A-D and TP-3D. 29-079-WR-1 is composite of WR-1A through -1C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X , No___, Number: 1 Identification: Adit #1 at WR-1

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes X , No___, Number: 1 Identification: Adjacent to unnamed tributary; probably expression of adit discharge.

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 63

Distance to nearest well used for drinking? 2 miles

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
Water in adit may be in contact with ore, but neutral pH and low metals levels in discharge.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Discharging adit at WR-1	1 gpm (M)	8.1	145	403	5.0	55	N/A	29-079-SW-3	08/25/93 1545	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Indian Creek

Dry streambeds: Yes ___, No X, Name(s): ___

Other surface water: Yes X, No ___, Name(s)/Description: Discharge from Adit #1; shallow standing water on TP-1 and TP-2

Waste materials within any floodplain: Yes X, No ___ Source ID(s): TP-3

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 22 cfs
High Flow: 250 cfs, Average Flow: 25 cfs

Distance between waste source(s) and nearest surface water body (ft)? 200 feet

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Discharge from Adit #1 flows across possible waste rock.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetlands, agriculture, irrigation

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X, Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): ___

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	In Indian Creek, 75 feet up from confluence with adit discharge.	N/A	N/A	N/A	N/A	N/A	22 cfs (M)	29-079-SE-1	08/25/93 1745	T-Metals
SE-2	SE	In Indian Creek at PPE of TP-3	N/A	N/A	N/A	N/A	N/A	22 cfs (M)	29-079-SE-2	08/25/93 1630	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes X , No___, Describe: Very narrow drainage with wetlands streamside

Carbonate rocks/soils: Yes X , No___, Describe: Marble present on site and in waste rock piles; soils are also carbonaceous.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Flammang

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
TP-1	None	Partial	16,200	12,150	Yes	Low
TP-2	None	Partial	7,650	1,913	Yes	Low
TP-3	None	Dry	11,700	1,170	Yes	None
WR-1	SO3	Dry	67,500	67,500	Yes	Moderate - when disturbed
Adit #1	None	N/A	N/A	N/A	N/A	N/A

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes_____, No_X_,
Describe:____

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments____

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads? "No Trespassing" signs

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment______________
Wilderness Area - Yes___, No_X_, Comment______________
T&E Species Habitat - Yes___, No_X_, Comment______________
Bat Habitat - Yes___, No_X_, Comment______________

Primary Drainage___; Secondary Drainage_X_; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _6_
Sport Fishery Classification - _6_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_1_, types and locations:___
Adit #1 at WR-1

Hazardous structures: Yes_X_, No___, Number_2_, types and locations:_
Mill building and possible garage are open (sheet metal building); waste rock is eroding away under southwest corner.

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number____, types and locations: WR-1 is eroding away under building. All slopes are steep, unvegetated, and at angle of repose.

Fire and/or Explosion hazards: Yes_X_, No___, Explain: The 4 empty fue tanks may contain sludge and fumes.

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Red Pine, Prepared by Northern Engineering and Testing, October 8, 1988.

USBM, Gold Lode Mining in the Tobacco Root Mountains, Madison County, Montana, Information Circular 6972, Written by S.H. Lorain, November 1937.

USGS, Mining Districts of the Dillon Quadrangle, Montana, and Adjacent Areas, Bulletin 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Nobel Peak, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

RED PINE
PA NO. 29-079

Red Pine PA# 29-079
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 08/25/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-079-SE-1	5.96	42.3 J	1.04 UJ	9.92	38.6 JX	39.1	13600	0.039 UJ	460 J	28 JX	7.4 UJX	7.14 UJ	64.9 J	NR
29-079-SE-2	9.58	51.5 J	1.21 UJ	10.4	44.6 JX	43.4	14800	0.031 UJ	931 J	34.4 JX	8.68 UJX	8.38 UJ	58.2 J	<0.334
29-079-TP-1	62.7	193 J	0.97 UJ	17.4	26.5 JX	236	43900	0.432 J	3150 J	48.3 JX	27.8 JX	11.8 J	61.3 J	NR
29-079-TP-2	68.2	125 J	0.99 UJ	17.9	29.9 JX	298	43200	0.442 J	2950 J	42.1 JX	38.1 JX	30.4 J	74.6 J	<0.290
29-079-TP-3	5.18 U	83.6 J	0.99 UJ	10.5	31.6 JX	42.5	19000	0.031 J	1510 J	26.3 JX	7.09 UJX	6.85 UJ	40.3 J	<0.284
29-079-WR-1	64.5	39.2 J	0.80 UJ	19.5	12.6 JX	408	39600	0.453 J	3420 J	35 JX	14 JX	42.7 J	75.4 J	NR
BACKGROUND	26	154	8.6 JX	15.3	26.1	29.6	20200	0.021	1240	43	89	4 UJ	70	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-079-TP-1	0.7	21.9	346	324	<0.01	0.64	0.31	20	326
29-079-TP-2	0.64	20	184	164	0.21	0.39	0.04	12.2	172
29-079-TP-3	0.06	1.87	32.6	30.7	0.02	0.01	0.03	0.31	32.2
29-079-WR-1	3.8	119	379	260	<0.01	2.39	3.88	74.7	304

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-079-SW-3	1.07	5.73	2.57 U	9.7 U	6.83 U	1.55 U	43.1	0.21 JX	5.47	12.7 U	2.24 J	30.7 U	10.9 J	50.7

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

Field I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-079-SW-3	90	< 5.0	< 5	0.07	NR

LEGEND

SE1 – In Indian Creek, 75' up from confluence with adit discharge.
SE2 – In Indian Creek at PPE of tailings pond 3.
TP1 – Composite of subsamples TP1AA through 1AC, 1BA, 2AA through 2AC, and 3A through 3C.
TP2 – Composite of subsamples TP1BB through 1BE.
TP3 – Composite of subsamples TP2AD and 3D.
WR1 – Composite of subsamples WR1A through 1C.
BACKGROUND – From NW SE Sec. 26 (29-476-SS-1).

XRF ANALYSIS RESULTS

RED PINE
PA NO. 29-079

MDSL AMRB/PIONEER 4/9/93

Mine Name: Red Pine PA# 29-079
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-079-SE-2		5688.44	15499.5	1818.78		2314.1	36906.4		45.1782 *			237.783
29-079-TP1A-A		12332.3	172938	1372.47		3829.45	29147.8		127.579 *		73.7463 *	148.346
29-079-TP1A-B		4058.5	141881	345.235 *		4503.92	35412		224.757		65.3522 *	141.4
29-079-TP1A-C		7155.23	155377	558.512		4634.75	30490		94.0087 *		117.254 *	156.987
29-079-TP1B-A		6774.05	144389	687.905		3778.81	30766.9		186.085 *			145.391
29-079-TP1B-B		34672.9	40508.1	2631.78	163.648 *	1865.92	40949.7		144.197 *		126.335 *	57.9049
29-079-TP1B-C		12181.9	69322.8	1040.25		2392.2	35481.7		222.519		59.7207 *	84.0135
29-079-TP1B-D		8798.4	89570.7	756.014		2645.5	28118.5		119.045 *		47.066 *	110.553
29-079-TP1B-E		17159.4	32364.1	1690.68		2378.23	42019.6		310.659		91.1048 *	49.9192
29-079-TP2A-A				3071		1920.49	35372.1		204.815 *			64.9092
29-079-TP2-C		14140.2	112250	1746.68		2983.75	31884.5		129.162 *		82.0152 *	148.359
29-079-TP2-D		7239.33	28434.3	1697.4	166.351 *	3422.35	29628		42.6817 *			126.062
29-079-TP3-A		6774.01	123277	671.687		2989.34	23143.9		238.725		55.6473 *	138.882
29-079-TP3-B		23995	40163.8	2138.06		1486.36	33932.4		196.451 *		36.115 *	64.4151
29-079-TP3-C		18648.3	73394.8	1588.6		3285.3	41131.7		130.412 *		83.174 *	90.2148
29-079-TP3-D		13397.9	14789.7	2445.93		1206.8	28478.9		60.365 *	54.9602 *	28.8856 *	169.602
29-079-TP-1-COMP		16639.8	100894	1727.93	177.711 *	2665.05	34464.1		241.218	59.1534 *	72.5869 *	110.587
29-079-TP-2A-B	481 $	32183 $	56565 $	3005 $	212 $	1990 $	43315 $	302 $	347 $	29 $	63 $	69 $
29-079-TP-2A-C	73 $	7155 $	155377 $	559 $	60 $	4635 $	30490 $	37 $	94 $	3 $	117 $	157 $
29-079-TP-2-COMP		17109.3	85111.7	1707.64		2943.95	38440.9		251.397	91.5628 *	54.3799 *	86.351
29-079-TP-3-COMP		10067.8	27221.6	2374.19	207.266 *	3317.72	34439		68.3801 *			137.209
29-079-WR1-A		12130.1	83250.6	1887.16		3712.46	35526.9		94.8022 *		36.9146 *	69.197
29-079-WR1-B		17933.9	109154	1355.87		3290.67	24211.3		241.389		58.4313 *	128.484
29-079-WR1-C		19678.3	61690.5	1428.95		2680.31	47328.9		1226.88	105.093 *	124.213 *	66.6678
29-079-WR-1-COMP		12679	76286.6	1907.93	188.84 *	3321.89	37302.9		364.016	70.6071 *	86.0941 *	75.6351

Mine Name: Red Pine PA# 29-079
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-079-SE-2	96.5597				56.9375			411.835	98.918 *		
29-079-TP1A-A	41.798				90.1426			159.181	132.12 *		
29-079-TP1A-B	19.4638				34.4478 *						
29-079-TP1A-C	24.5295			36.7044 *	62.4679	143.911 *		107.858	119.897 *		7.44389 *
29-079-TP1B-A	35.1945			34.3941 *	50.4263			123.108			
29-079-TP1B-B	55.8095			45.1146 *	225.545			251.281			23.9958
29-079-TP1B-C	77.0613			21.9244 *	79.9608			171.635			10.344 *
29-079-TP1B-D	43.501		4.8141 *	24.1423 *	61.0072			126.049			
29-079-TP1B-E	101.801			20.309 *	101.063		66.9396 *	284.322			11.8875 *
29-079-TP2A-A	136.788			21.5088 *	161.156			248.257			11.1472 *
29-079-TP2-C	64.2331				80.2387			220.029	114.128 *		
29-079-TP2-D	93.8691				37.2316			310.57			
29-079-TP3-A	38.1913				50.8782			220.849	109.502 *		
29-079-TP3-B	110.272				128.088			214.19	125.162 *		
29-079-TP3-C	47.0247		6.5251 *	41.9741 *	98.6197			661.076	106.393 *		5.81753 *
29-079-TP3-D	181.826				83.6779			563.936			6.19431 *
29-079-TP-1-COMP	61.0884				107.939			252.818	87.6811 *		12.3591 *
29-079-TP-2A-B	104 $			32 $	172 $	97 $		234 $	83 $	10 $	4 $
29-079-TP-2A-C	25 $		1 $	37 $	62 $	144 $	18 $	108 $	120 $		7 $
29-079-TP-2-COMP	78.9686			43.1285 *	104.639			229.795	95.9266 *		17.7676 *
29-079-TP-3-COMP	165.022				67.6406			362.48	83.0354 *		10.6659 *
29-079-WR1-A	58.9564				79.0384			161.235			
29-079-WR1-B	41.8725				86.9941		48.4217 *	92.5621			
29-079-WR1-C	56.3607			51.0292 *	112.09		183.188	174.92	81.1426 *		9.52925 *
29-079-WR-1-COMP	48.5192			19.7498 *	79.7833			160.485	110.006 *		10.4757 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

RED PINE
PA NO. 29-079

AIMSS SCORESHEET

SITE NAME: RED PINE
PA NUMBER: 29-079

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.002
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		63
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	63.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	12625
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.292
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	12
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	620
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.018
29		POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	20
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	27
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.013
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	1
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.13**

SITE NAME: RED PINE
PA NUMBER: 29-079

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	80
6		EXPLOSIVES		50
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	280
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	1
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**2.80**

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BROADGAUGE **PA#:** 29-293

Date: June 16, 1993 **Time:** 0800-1308

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Overcast, drizzle to rain; foggy; cool, wet spring.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #12: WR-2; #13: WR-3; #14: WR-4 and two fenced shafts; #15: Caved adit; #16: WR-1. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): Access by truck (road to site is easy, but slippery from rain and mud). No background soil was taken because there is a mine above this site and also up the road from this site (Toledo mine). Three trenches were found with small dumps on ridge above mine.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Move WR-1 out of drainage; revegetate and contour all dumps. Fill shafts.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BROADGAUGE PA#: 29-293

Legal Description: T 4S ;R 4W ;Sec. 17 ,SE 1/4SW 1/4 1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 28' 56" Longitude: W 112° 08' 04"

Primary Drainage Basin and Code: Mill Creek/10020003
Secondary Drainage Basin: Spring Park Creek

USGS Quadrangle map name(s): Sheridan

Mine Type/Commodities: Hardrock/Gold, Silver

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact(Include address and phone when available): Raymond Lopata, Jr., 5103 Chase Street, Downers Grove, IL 60515. (708) 963-2334.

Relationship to other mines/sites in the area/district: Northeast of Tamarack mine, which is owned and operated by the same company as this site; Toledo mine is located above.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Two shafts have been previously fenced by MDSL (no signs).

General site features: Elevation 6280', Slope 25°, Aspect Southeast

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 2 acres.
Dimensions: 200 feet x 350 feet

Predominant vegetation types: Willow, sagebrush, grasses, Canadian thistle

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites). On the same road as the Toledo mine.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 25 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the northwest side of intermittent (mostly dry) Spring Park Creek, which flows southwest away from the site. Spring Creek meets perennial Mill Creek approx. 1 1/2 miles from the mine.

Mining/milling history, ore type/tenor, host rock, gangue: From 1908 to 1935 inclusive production was reported as 5,055 oz. Au and 380 oz. Ag from 8,976 tons of ore. Ore mined until 1935 was completely oxidized and values were almost completely from free gold in quartz. Ore bodies are replacements and impregnations along zones of intense fracturing in limestone near intrusive sheets and masses.

Mine Operation?
Shafts - Yes X , No ___, # 2 , Comment One open; one caved; both fenced
Adits - Yes X , No ___, # 1 , Comment Caved; water flow
Pits - Yes ___, No X , # ___, Comment
Placers - Yes ___, No X , # ___, Comment
Other - Yes ___, No X , # ___, Comment

Mill Operation? Yes ___, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

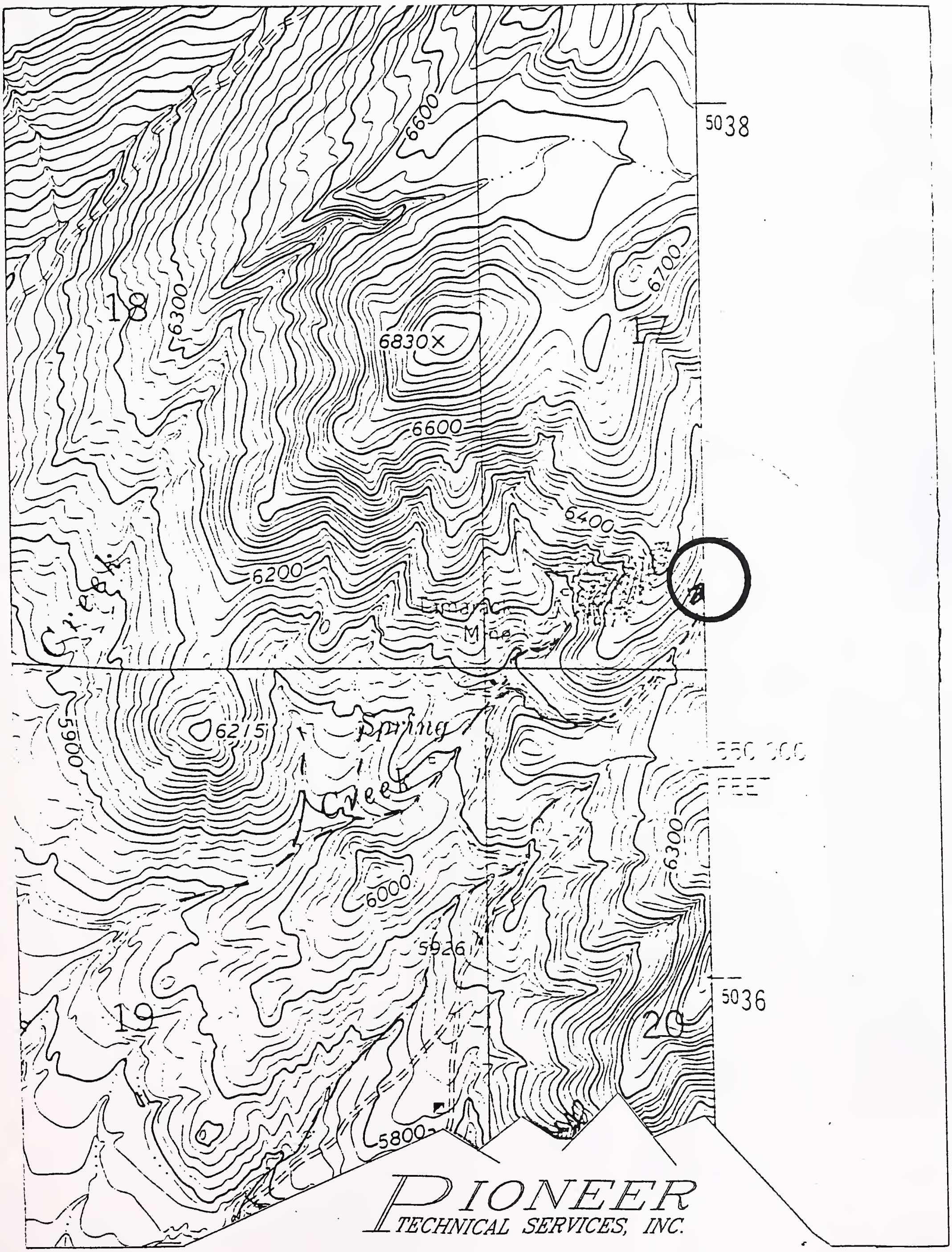
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

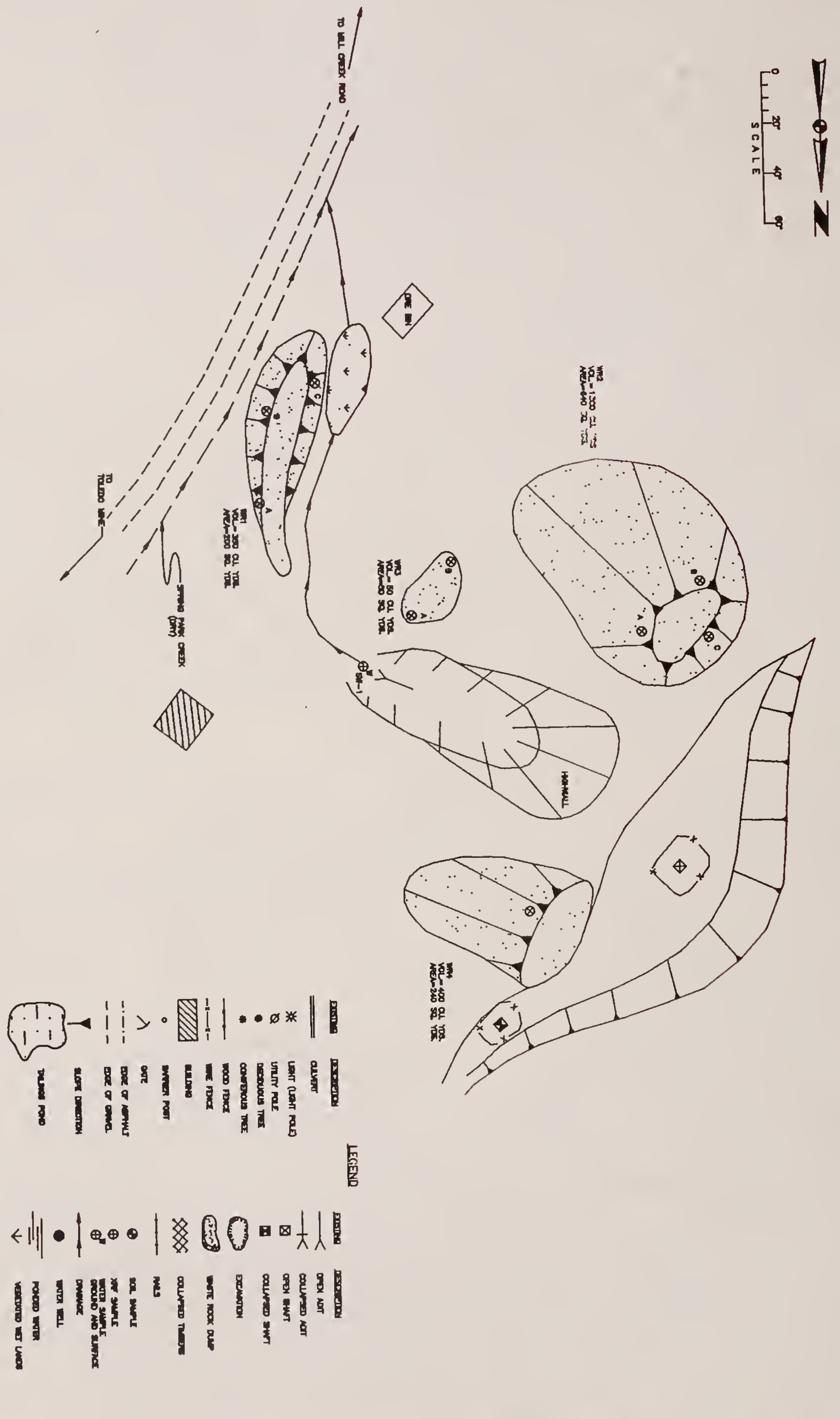
Well No.	Location	Depth	Yield	Static Water Level
M:107787	04S 04W 19 BBA	200.0	5.0	38.00
M:107788	04S 04W 19 BD	200.0	4.0	30.00
M:107791	04S 04W 19 D	30.0	8.0	10.00
M:107789	04S 04W 19 D	30.0	8.0	10.00
M:107790	04S 04W 19 D	78.0	25.0	23.00
M:107792	04S 04W 19 DB	21.0	800.0	13.00
M:107793	04S 04W 19 DBD	10.0	800.0	6.00
M:107796	04S 04W 19 DC	42.0	350.0	39.00
M:107797	04S 04W 19 DC	10.0	25.0	0.00
M:107795	04S 04W 19 DC	45.0	12.0	14.00
M:107794	04S 04W 19 DC	41.0	20.0	12.00
M:107799	04S 04W 19 DCA	19.0	2.0	0.00
M:107798	04S 04W 19 DCA	41.0	90.0	10.00
M:122644	04S 04W 19 DCD	30.0	30.0	8.00
M:107800	04S 04W 19 DD	0.0	10.0	0.00
M:107801	04S 04W 19 DDA	70.0	20.0	51.00
M:107802	04S 04W 19 DDC	0.0	10.0	0.00
M:107803	04S 04W 19 DDD	44.0	21.0	10.00
M:107804	04S 04W 20 C	59.0	25.0	15.00
M:107805	04S 04W 20 CD	95.0	12.0	45.00
M:107806	04S 04W 20 CDB	61.0	12.0	35.00
M:107807	04S 04W 20 DA	36.0	10.0	15.00
M:32010	04S 04W 20 DB	300.0	70.0	6.00
M:107808	04S 04W 21 BDDD	26.0	10.0	20.00
[illegible]107809	04S 04W 21 DA	117.0	37.0	0.00



PIONEER
TECHNICAL SERVICES, INC.

BROADGAUGE, P.A. NO: 29-293

T04S, R04W, SECTION 17
SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BROAD GAUGE PA# 29-293
SHERIDAN DISTRICT MADISON COUNTY

PIONEER
TECHNICAL SERVICES, INC. BUTTE, MT.

TD&H
THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

DRAWN	JTP	DATE	7 DEC 93
DESIGNED	TPR	JOB NO.	93-17
APPROVED	WJB	F.B. NO.	

29-293.DWG SHEETS

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	350	Dump approx. 45 feet south of the cabin, along road; north end	None	< 3.5 (D)	0.03	29-293-WR-1	06/15/93 1000	T-Metals, ABA
WR-1B	WR		Dump approx. 45 feet south of the cabin, along road; middle	None	3.5 (D)	0.03			
WR-1C	WR		Dump approx. 45 feet south of the cabin, along road; south end	None	3.75 (D)	0.03			
WR-2A	WR	1,300	Large dump in southwest section of site, assoc. with west shaft; east end	None	< 3.5 (D)	0.03	29-293-WR-2	06/15/93 1020	T-Metals, ABA
WR-2B	WR		Large dump in southwest section of site, assoc. with west shaft; south end	None	4.8 (D)	0.04			
WR-2C	WR		Large dump in southwest section of site, assoc. with west shaft; west end	None	3.5 (D)	0.03			
WR-3A	WR	50	Small dump, south of adit; north side	None	6.3 (D)	0.04	N/A	N/A	XRF Analysis
WR-3B	WR		Small dump, south of adit;	None	6.2 (D)	0.05	N/A	N/A	XRF Analysis
WR-4	WR	400	Dump in north portion of site, assoc. with north shaft; center	None	6.2 (D)	0.04	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-293-WR-1 is composite of WR-1 through -1C. 29-293-WR-2 is composite of WR-2A through -2C.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes_X_, No___, Number:_1_ Identification:_Only caved adit on site (SW-1).

Filled shafts: Yes___, No_X_, Number:___ Identification:___

Seeps/Springs: Yes___, No_X_, Number:___ Identification:___

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_139_

Distance to nearest well used for drinking?_Approx. 1 mile_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite___, Probable___, Possible_X_, Unlikely___.
Water is flowing from adit; uncontained sources (waste rock dumps) wit elevated metal values.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC $\mu S/cm$ @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	AD	Caved adit flowing	< 1 gpm (E)	7.36	332	123	9.5	187	N/A	29-293-SW-1	06/15/93 1230	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X__, Name(s):____________________

Dry streambeds: Yes_X__, No___, Name(s): Spring Park Creek drainage; ill-defined here, cannot tell which side of road is drainage or if the road is the drainage.

Other surface water: Yes____, No_X__, Name(s)/Description:__________

Waste materials within any floodplain: Yes_X__, No___ Source ID(s): WR-1 in floodplain of Spring Park Creek.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)?____________________
High Flow: 0.05 cfs , Average Flow: Dry

Distance between waste source(s) and nearest surface water body (ft)? 5 feet

Surface water draining onto or through waste sources: Yes____, No_X__,
Describe: Water flowing from adit; this is the only source of water because drainage is dry, but does not flow on or through dumps.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) Mill Creek has agriculture; Ruby River, five miles below site, has agriculture, irrigation, recreation, fishery, and wetlands.

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X__, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):__________

SURFACE WATER INVENTORY FORM

SAMPLERS: ______

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC μS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 to 2 acres

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No___, Describe: Host rock is described as limestone.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000 X ; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? Approx. 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3; pH	Dry	1,800	1,620	Yes	Moderate
WR-2	SO3; pH	Dry	5,760	5,184	Yes	Moderate
WR-3	SO3 (few); pH	Dry	450	405	Yes	Moderate
WR-4	SO3 (least)	Dry	2,160	1,944	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:______________________________

Population within 1 mile: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments______________________________

Evidence of recreational use on site: Yes_X_, No___, Describe:_______ Hunting shells

Accessibility - Fences, warning signs, closed roads? Stock fences on road; shafts fenced

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________________
Wilderness Area - Yes___, No_X_, Comment________________
T&E Species Habitat - Yes___, No_X_, Comment________________
Bat Habitat - Yes___, No_X_, Comment________________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_2_, types and locations:___ One open and one caved shaft; both are fenced, but with loose barbed wire and no signs.

Hazardous structures: Yes___, No_X_, Number____, types and locations:_ Only one standing wooden building with one room.

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_1_, types and locations: The caved adit is an unstable highwall.

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:______________________________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________

Bibliography

MBMG, Broadgauge Mine, Madison County, Form 39, 1974.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Broadgauge, Prepared by Northern Engineering and Testing, November 10, 1988.

USBM, Gold Lode Mining in the Tobacco Root Mountains, Madison County, Montana, Information Circular 6972, Written by S.H. Lorain, November 1937, pp. 61-64.

USGS, Mining Districts of the Dillon Quadrangle, Montana and Adjacent Areas, Bulletin 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Sheridan, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

BROADGAUGE
PA NO. 29-293

Broad Gauge PA# 29-293
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - TUESDAY
INVESTIGATION DATE: 07/16/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-293-WR-1	208	33.6	9.3 J	19.5	65	213	59400	0.344	1620	73	2660	4 UJ	1900	NR
29-293-WR-2	257	37.3	0.6 J	26.7	58.4	63.2	31900	0.409	1630	109	231	3 UJ	164	NR
BACKGROUND	16	89.4	0.8 JX	9.4	25.1	21.6	14900	1.1	366	19	36	4 UJ	80	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-293-WR-1	2.46	76.9	135	58.5	1.6	0.38	0.48	11.9	123
29-293-WR-2	1.53	47.8	169	122	1.1	0.21	0.22	6.56	163

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-293-SW-1	8.65	10.6	2.55 U	5.99 U	5 U	6.9 J	640	0.14	77.3	8.78 U	32.9	18.3 U	190	280

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-293-SW-1	360	< 5.0	106	0.31	NR

LEGEND

WR1 - Composite of subsamples WR1A, 1B, and 1C.
WR2 - Composite of subsamples WR2A, 2B, and 2C.
BACKGROUND - From the Latest Out Mine (29-354-SS-1).
SW1 - Caved flowing adit.

XRF ANALYSIS RESULTS

BROADGAUGE
PA NO. 29-293

MDSL AMRB/PIONEER 4/9/93

Mine Name: Broad Gauge PA# 29-293
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-293-WR1-A		10121.1	31667	2144.67	142.302 *		85084.6	518.827 *	176.18 *	926.053		32.1935
29-293-WR1-B	351.034 *	9192.47	35162.7	2004.63	208.244 *	1889.61	39342.1		172.571 *	2661.73		24.3682
29-293-WR1-C		12056.4	30515.3	2595.48	231.861 *	1862.19	41757.5		141.169 *	1964.09		25.0972
29-293-WR1-C-DUP		9573.28	28474.5	2251.01	299.789 *	907.659 *	64164.8		167.522 *	1540.05		35.1503
29-293-WR2-A		24071.3	24136	3046.56	199.691 *		40457.4		101.653 *	197.327	805.121	42.0401
29-293-WR2-B		7679.48	76483.3	613.678	310.396	3245.51	12981			196.981		58.6598
29-293-WR2-C	486.908 *	12777.5	15844	2829.35	177.393 *	496.77 *	42499.9		49.8386 *	238.989		29.8446
29-293-WR3-A		15267.2	36632.3	1959.07	184.381 *		52469.1		100.851 *	460.146	717.988	39.2748
29-293-WR3-B		4783.56	55515.1	1022.58	144.166 *	14503.2	23704.4		463.195	38504.8		43.7737
29-293-WR-1-COMP		9998.66	28892.1	2279	270.94 *		72165.3		186.413 *	1502.23		35.2612
29-293-WR-2-COMP		15317.1	30099.2	2387.54	248.713 *	1168.54 *	34325.4		57.0882 *	180.225	150.62 *	32.8816
29-293-WR-4	432.553 *	15912.1	7836.46	4569.07	295.582 *	853.767 *	48355.3		47.5304 *	194.264		19.307

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-293-WR1-A	80.3193			2581.57	72.9593		68.6909 *	50.1432	360.668 *		
29-293-WR1-B	82.0647			779.895	57.8029		33.7618 *	40.0924			
29-293-WR1-C	106.441			1191.09	70.5019		47.9729 *	57.03	248.495 *		
29-293-WR1-C-DUP	82.6161			1640.08	72.5239			55.7363			
29-293-WR2-A	109.359			530.292	108.351		170.709	84.6303	339.624 *		
29-293-WR2-B	20.9516			27.2991 *	92.4746			68.4329		10.9161 *	5.49176 *
29-293-WR2-C	90.6427				73.1775			134.375	273.386 *		
29-293-WR3-A	84.1451			2809.56	73.2814		126.845	46.723	293.148 *		
29-293-WR3-B	47.966			349.533	52.9254		78.0732 *	101.264	406.583 *		
29-293-WR-1-COMP	101.27			1609.79	60.6984		63.5073 *	58.926	255.627 *	9.48519 *	
29-293-WR-2-COMP	74.08			139.6	87.2126		53.0257 *	77.7644	220.775 *	9.5028 *	6.53956 *
29-293-WR-4	126.333			25.489 *	60.5008			147.967		8.60834 *	

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BROAD GAUGE
PA NO. 29-293

MDSL AMRB/PIONEER 4/9/93

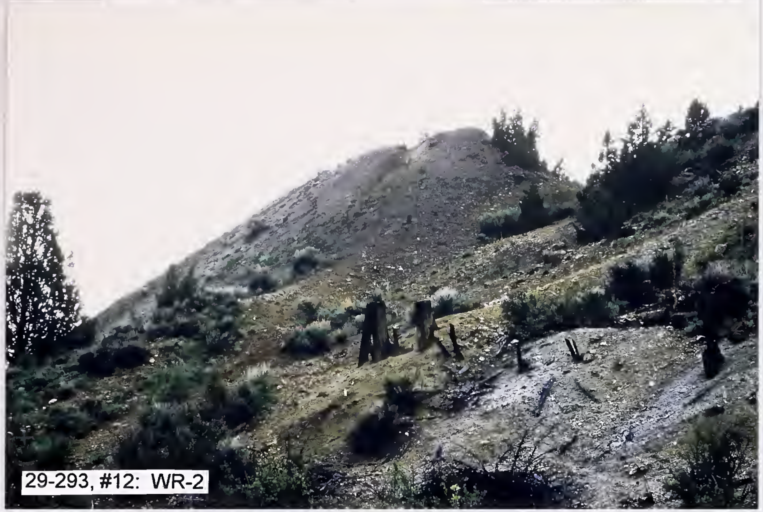
AIMSS SCORESHEET

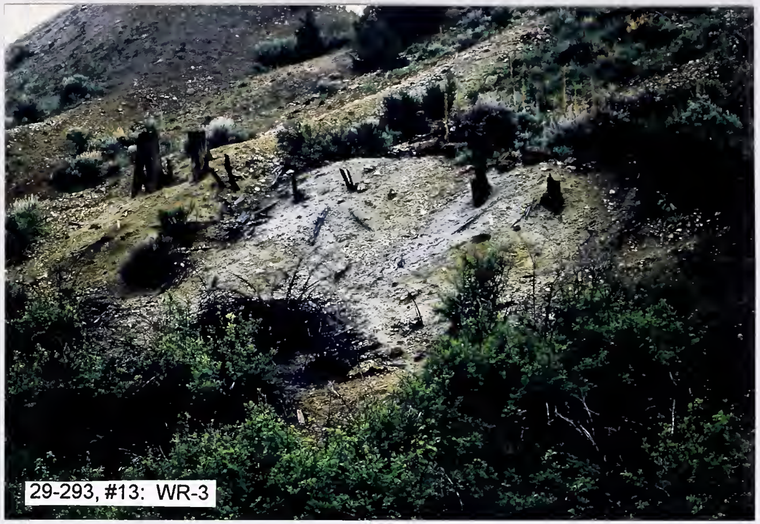
SITE NAME: BROADGAUGE MINE
PA NUMBER: 29-293

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.459
6		WELLS - 1 MI. x 2.5		62.5
7	GW - TARGETS	WELLS - 1 TO 4 MI		114
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	176.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	51503
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	400
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.591
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	11455
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.038
29		POPULATION - 4 MILES		300
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	310
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	884
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.035
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	12
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	42
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.64**

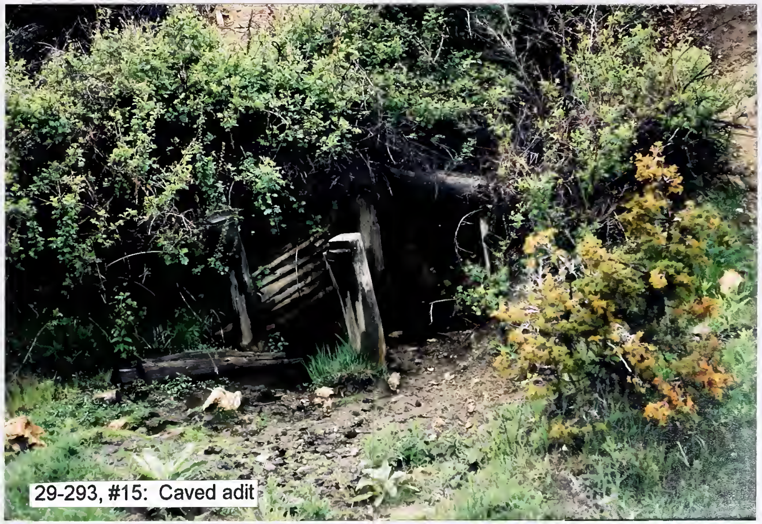
SITE NAME: BROADGAUGE MINE
PA NUMBER: 29-293

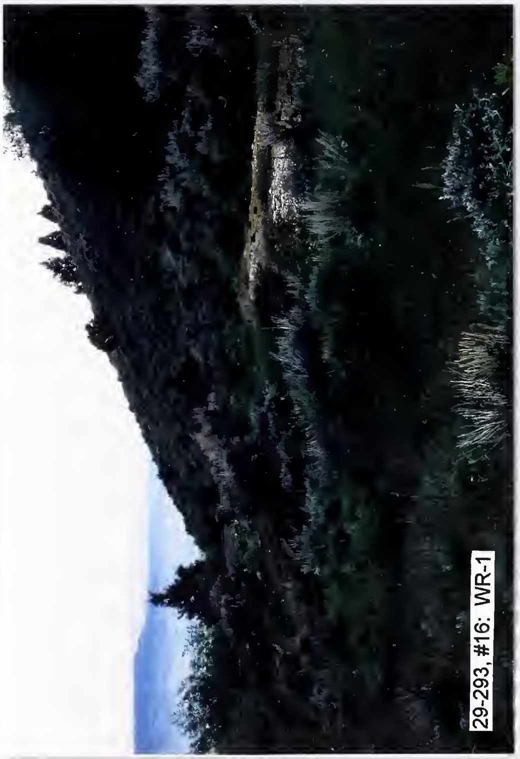
LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	200
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	75
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	275
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	12
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**33.00**


29-293, #12: WR-2


29-293, #13: WR-3

29-293, #14: WR-4 and views of 2 fenced shafts


29-293, #15: Caved adit



29-293, #16: WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LATEST OUT PA#: 29-354

Date: June 17, 1993 Time: 0800

Field Team Leader: Babits, Pioneer

Sampling Personnel: Pierson, TD&H
Lasher, Pioneer

Visitors: None

Weather/Seasonality Observations: Warm (55°F); partly cloudy; slight breeze; no rain for 8 hours before the investigation; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #12: WR-4 on left and WR-3 on right; #13: Adit below WR-5 (HMO); #14: Shaft and dump at WR-1; #15: WR-9 adit; #16: WR-8. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Fill in shafts with waste rock; recontour and revegetate remaining waste rock.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LATEST OUT PA#: 29-354

Legal Description: T 4S ;R 4W ;Sec. 32 ,NE 1/4SE 1/4 1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 26' 35" Longitude: W 112° 06' 53"

Primary Drainage Basin and Code: Ruby River/10020003
Secondary Drainage Basin: Sand Coulee

USGS Quadrangle map name(s): Copper Mountain

Mine Type/Commodities: Hardrock/Unknown

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): BLM or USFS

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Some staking done with MDSL PA Nos., but no reclamation.

General site features: Elevation 6300' , Slope 25° ,
Aspect Southeast and Southwest (two drainages)

Land use: Mining___, Recreational___, Residential___, Urban___,
Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 1.5 acres.
Dimensions:

Predominant vegetation types: Sage, grasses

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 7 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Sand Coulee drainage is in the center of the site although it is dry. Water leaving the site would flow in Sand Coulee southwest to junction with Horse Creek approx. 1 mile below the site. Horse Creek flows southwest into Vigilante Canal, which eventually flows into the Ruby River. The site is underlain by granite.

Mining/milling history, ore type/tenor, host rock, gangue: Host rock granite, some limestone; no other information available.

Mine Operation?

Shafts - Yes X , No ___ , # 3 , Comment Open and partially open
Adits - Yes X , No ___ , # 9 , Comment 4 open; others collapsed
Pits - Yes ___ , No X , # ___ , Comment
Placers - Yes ___ , No X , # ___ , Comment
Other - Yes ___ , No X , # ___ , Comment

Mill Operation? Yes ___ , No X . If yes answer the next three questions:

Period(s) of Operation: N/A

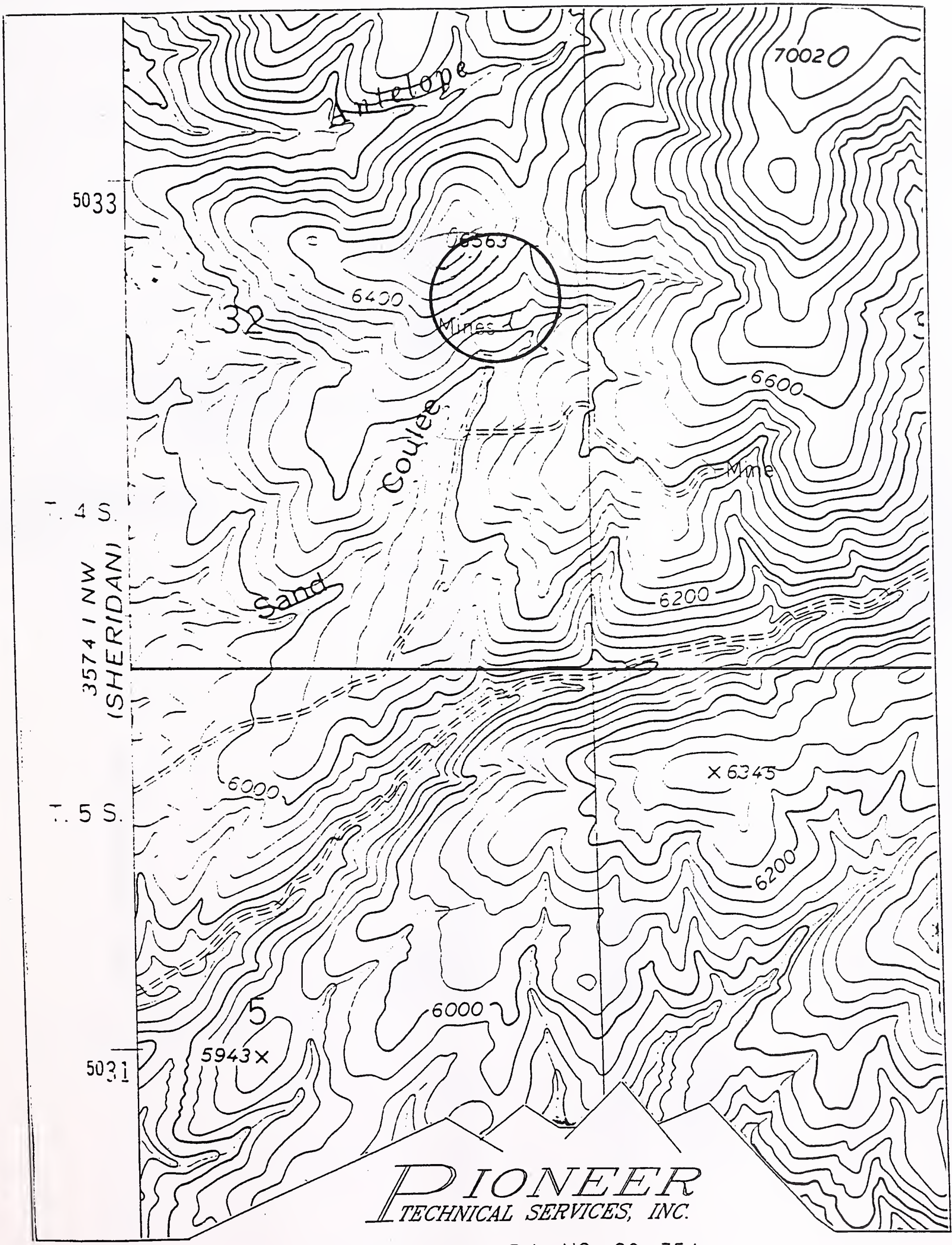
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___ ; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

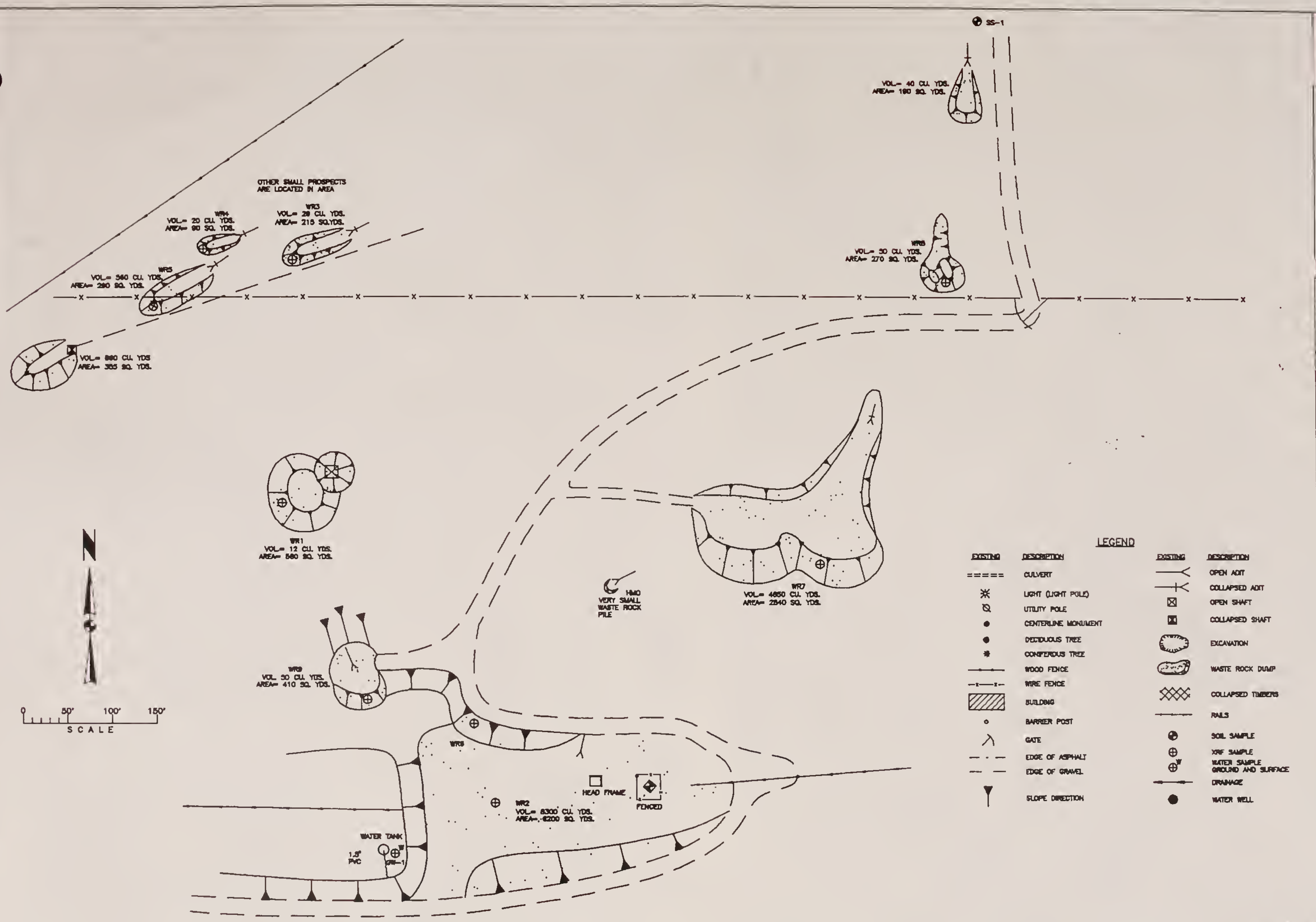
10/22/1993

Well No.	Location	Depth	Yield	Static Water Level
M:107814	04S 04W 30 BBC	38.0	80.0	6.00
M:107813	04S 04W 30 BBC	180.0	10.0	0.00
M:107815	04S 04W 30 BC	36.0	25.0	26.00
M:107816	04S 04W 30 BCBB	34.0	30.0	5.00
M:107817	04S 04W 30 CAC	200.0	18.0	68.00
M:107818	04S 04W 30 DB	60.0	30.0	33.00
M:107819	04S 04W 30 DBC	48.0	30.0	25.00



PIONEER
TECHNICAL SERVICES, INC.

LATEST OUT, P.A. NO. 29-354
T04S, R04W, SECTION 32
SCALE: 1' = 1000'



DRAWN JTP DATE 2 AUG. 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

LATEST OUT PA# 29-354
SHERIDAN DISTRICT MADISON COUNTY

SHEET NO.

29-354.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	12	West side of WR-1	None	6.8 (D)	0.03	29-354-WR-2	06/17/93 1300	T-Metals, ABA
WR-2	WR	8,300	Center of WR-2	None	6.8 (D)	0.05			
WR-3	WR	29	West side of WR-3	None	6.2 (D)	0.06	29-354-WR-1	06/17/93 1245	T-Metals, ABA
WR-4	WR	20	West side of WR-4	None	6.8 (D)	0.03			
WR-5	WR	560	West side of WR-5	None	6.8 (D)	0.03			
WR-6	WR	Small	South side of WR-6	None	6.8 (D)	0.05			
WR-7	WR	4,850	South side of WR-7	None	6.8 (D)	0.04			
WR-8	WR	50	South side of WR-8	None	6.8 (D)	0.04			
WR-9	WR	50	South side of WR-9	None	6.0 (D)	0.04			
SS-1	BKGRND	N/A	Background soil 300' upgradient of WR-8	N/A	6.2 (D)	0.04	29-354-SS-1	06/17/93 1230	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-354-WR-1 is composite of WR-3, -4, and -5. 29-354-WR-2 is composite of WR-1, -2, and -6 through -9.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:____________

Filled shafts: Yes___, No_X_, Number:____ Identification:____________

Seeps/Springs: Yes_X_, No___, Number:_1_ Identification:_Downgradient of WR-2_

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_223_

Distance to nearest well used for drinking?_1 mile_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely_X__.
Small area of uncontained sources; little water on-site; metal values i dump, in general, are only slightly elevated.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
GW-1	GW	Spring below WR-2 in pipe	6 gpm (M)	7.42	400	328.3	11.3	1490	Unknown	29-354-GW-1	06/17/93 1220	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Sand Coulee

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): WR-2 in Sand Coulee drainage.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? Sand Coulee not flowing during investigation.
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between WR-2 and Sand Coulee.

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Sand Coulee when carrying water.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetland, agriculture; Ruby River has agriculture, irrigation, fishery, recreation, and wetlands.

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No X , Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS:____

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993):________________________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? No AMD

Wetlands present: Yes_X_, No___, Describe: Limited to streambanks

Carbonate rocks/soils: Yes_X_, No___, Describe: Carbonate precipitate on rocks.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30_X_; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO4	Wet	5,220	5,220	No	Low
WR-2	SO4	Wet	73,800	0	No	Low
WR-3	SO4	Wet	1,935	1,161	No	Low
WR-4	SO4	Wet	810	486	No	Low
WR-5	SO4	Wet	2,610	1,566	No	Low
WR-6	SO4	Wet	Small	Very Little	No	Low
WR-7	SO4	Wet	25,560	15,336	No	Low
WR-8	SO4	Wet	2,430	1,458	No	Low
WR-9	SO4	Wet	3,690	2,214	No	Low

Notes and Clarifications: WR-2 is well vegetated as are the tops of all others.

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X, Describe:________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments None

Evidence of recreational use on site: Yes___, No X, Describe:________

Accessibility - Fences, warning signs, closed roads? No restrictions

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X, Comment________
Wilderness Area - Yes___, No X, Comment________
T&E Species Habitat - Yes___, No X, Comment________
Bat Habitat - Yes X, No___, Comment Adits

Primary Drainage___; Secondary Drainage X; No Information___:

Riparian Habitat Quality - High___, Medium___, Low Not Rated
Wetlands Frontage - High___, Medium___, Low Not Rated
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No___, Number 7, types and locations: Three shafts and four adits

Hazardous structures: Yes___, No X, Number____, types and locations:________

Unstable highwalls, pits, trenches, slopes: Yes___, No X, Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes X, No____, Number 8, types and locations: All are uncontained.

Fire and/or Explosion hazards: Yes___, No X, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Latest Out, Prepared by Chen-Northern, June 26, 1989.

USGS, Topographic Map, Copper Mountain, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

LATEST OUT
PA NO. 29-354

Latest Out PA# 29-354
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 06/17/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-354-WR-1	32	177	3.3 JX	24.7	15	166	46300	0.015 U	1760	33	671	4 UJ	282	NR
29-354-WR-2	68	151	7 JX	31.3	49	227	37800	0.014 U	1190	83	329	4 J	214	NR
BACKGROUND	16	89.4	0.8 JX	9.4	25.1	21.6	14900	1.1	366	19	36	4 UJ	80	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-354-WR-1	<0.01	0	20.7	20.7	<0.01	<0.01	0.02	0	20.7
29-354-WR-1DUF	0.01	0.31	19.8	19.5	<0.01	<0.01	0.02	0	19.8
29-354-WR-2	0.26	8.12	31.9	23.8	0.24	<0.01	0.03	0	31.9

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-354-GW-1	1.69 U	49.1	2.55 U	5.99 U	5 U	1.53 J	14.6	0.25	17.9	8.78 U	1.55 U	18.3 U	6 U	178

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-354-GW-1	279	< 5.0	33	0.68	NR

LEGEND

WR1 – Composite of subsamples WR3, 4, and 5.
WR2 – Composite of subsamples WR1, 2, 6, 7, 8, and 9.
WR2DUP – Duplicate of sample 29-354-WR-2.
BACKGROUND – 300 feet upgradient of waste rock dump 8. From the Latest Out (29-354-SS-1).
GW1 – Spring below waste rock dump 2 in pipe.

XRF ANALYSIS RESULTS

LATEST OUT
PA NO. 29-354

Mine Name: Latest Out PA# 29-354
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-354-SS-1		18056.9	12540.7	2658.48		710.604 *	29308.4		138.611 *	80.3513 *	41.0732 *	97.2686
29-354-WR-1		16263.3	5066.9	2388.53		1001.1 *	63347.2		240.24 *	122.546 *	41.8106 *	298.709
29-354-WR-1-COMP		13608.8	18541.2	2373.28		3136.94	66268.6		217.814 *	292.698		316.204
29-354-WR-2		16874.1	32508.2	2469.68	198.993 *	4966.64	62615		1185.45	559.931	82.5424 *	32.2715 *
29-354-WR-2-COMP		18088	21240.1	2939.12	225.21 *	1834.02	49614.5		321.02	253.044		66.3978
29-354-WR-3		13441.8	16455.4	2891.94		2244.97	66476.1		150.333 *	158.747 *		122.725
29-354-WR-4		15033.4	18947.3	1991.01		4755.83	75981.1		171.491 *	223.391 *		312.678
29-354-WR-5		14596.1	16674.9	2285.86	156.405 *	2344.51	60477.3		300.506	479.557		471.894
29-354-WR-6		17257.2	6169.47	3616.64	264.52 *	867.273 *	62107		206.245 *	270.103		14.4871 *
29-354-WR-6-SUB		36718.3	17308.4	5414.43		479.525 *	34309.6		333.144	155.962 *	205.207 *	41.0961
29-354-WR-7		22720.5	26196.9	3237.53	308.167 *	3821.45	37950.1		240.31	364.006		45.6041
29-354-WR-8		13341.8	34394.9	1839.56	213.189 *		27332.6		189.707 *	119.441 *		82.0737
29-354-WR-9	429.168 *	25501.1	15073.1	3813.24	395.873 *	2382.59	46085.7		171.249 *	167.279 *		43.4935

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-354-SS-1	409.221				95.8144			515.101		15.515 *	14.6396 *
29-354-WR-1	207.933				82.1855			600.229		21.4016 *	10.3091 *
29-354-WR-1-COMP	145.596			493.792	74.7076			497.943	82.1544 *	13.833 *	
29-354-WR-2	137.373			162.59	101.129			149.002			
29-354-WR-2-COMP	136.922		5.88339 *	259.429	91.3107			280.009			8.85579 *
29-354-WR-3	83.8839			296.618	72.6013			355.89	141.58 *	28.0933 *	18.9561 *
29-354-WR-4	144.694			259.074	88.5129	149.313 *		530.089			13.6967 *
29-354-WR-5	126.018			591.845	62.0928 *			496.68			10.4883 *
29-354-WR-6	111.292		14.1741 *	365.525	94.9388			204.24		12.0385 *	8.94542 *
29-354-WR-6-SUB	157.541			556.043	137.555		136.45 *	128.246			12.2071 *
29-354-WR-7	126.225		6.99121 *		123.535			299.356			10.9072 *
29-354-WR-8	185.686			77.2188 *	110.959			314.33	68.6975 *		15.3108 *
29-354-WR-9	194.438			395.693	93.5926			200.266		16.3246 *	16.5736 *

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LATEST OUT
PA NO. 29-354

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

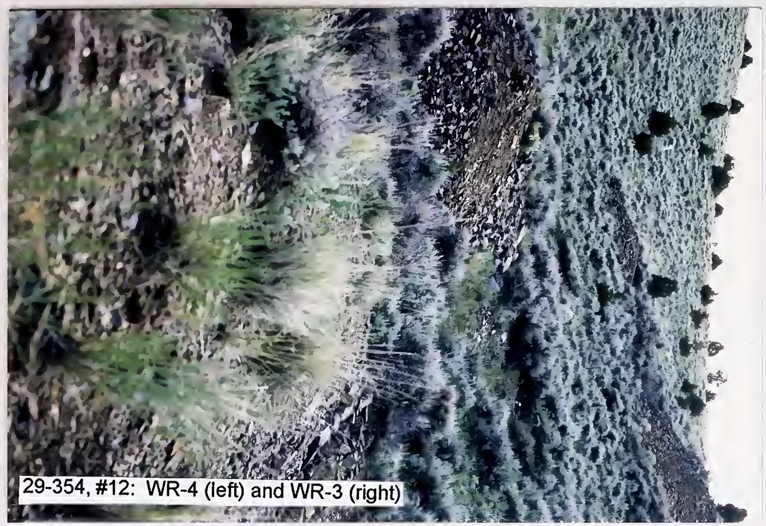
SITE NAME: LATEST OUT
PA NUMBER: 29-354

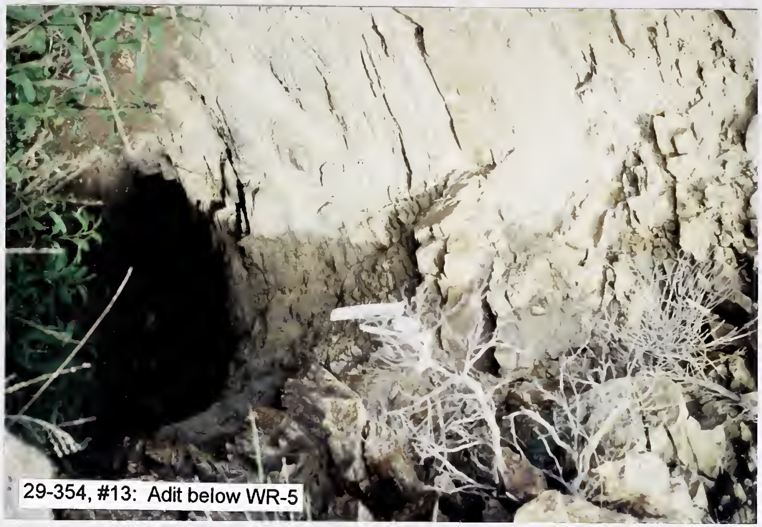
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	4.593
6	GW - TARGETS	WELLS - 1 MI. x 2.5		17.5
7		WELLS - 1 TO 4 MI		216
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	233.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	214493
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	5.176
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	3520
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.057
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	29
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.051
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**2.18**

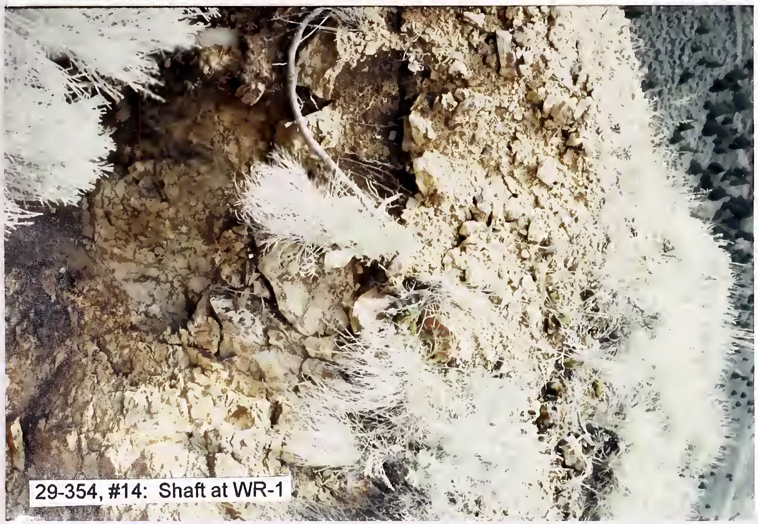
SITE NAME: LATEST OUT
PA NUMBER: 29-354

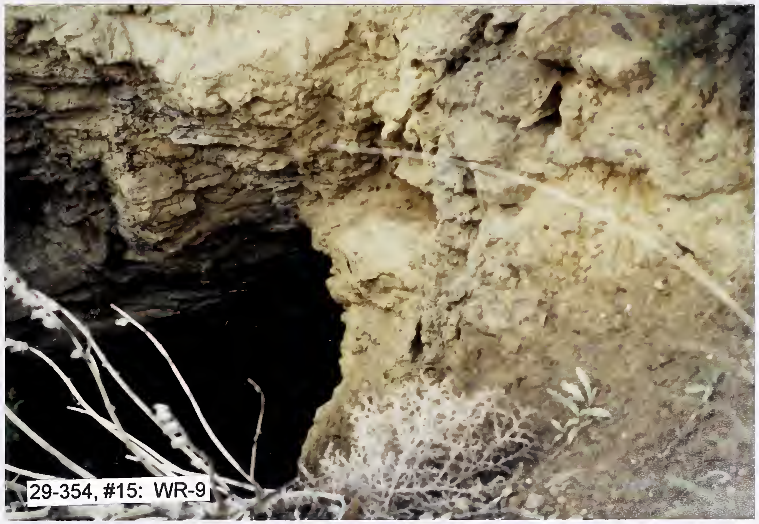
SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	300
3		OPEN ADITS	50 EA.	200
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	500
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**


29-354, #12: WR-4 (left) and WR-3 (right)


29-354, #13: Adit below WR-5


29-354, #14: Shaft at WR-1


29-354, #15: WR-9

29-354, #16: WR-8

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: UNCLE SAM PA#: 29-383

Date: June 16, 1993 Time: 0830

Field Team Leader: Babits, Pioneer

Sampling Personnel: Pierson, TD&H
Lasher, Pioneer

Visitors: Son of owner (did not give name)

Weather/Seasonality Observations: Cool (38°F); raining (showers for previous 8 hours); slight breeze (< 5 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #6: Overview of WR-1 from base; #7: WR-2 and its adit; #8: Confluence of Middle Fork Mill Creek and Mill Creek; #9: Discharge from lower adit at WR-1; #10: Discharge from upper adit at WR-1; #11: Lower adit at WR-1. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Waste rock could be recontoured and revegetated. Adit discharge is acidic and exceeds Maximum Contaminant Levels for Cd, Ni, and Sb.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): UNCLE SAM PA#: 29-383

Legal Description: T 4S ;R 3W ;Sec. 17 ,NE 1/4 ___1/4 ___1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 29' 35" Longitude: W 111° 59' 15"

Primary Drainage Basin and Code: Mill Creek/10020003
Secondary Drainage Basin: Middle Fork Mill Creek

USGS Quadrangle map name(s): Ramshorn Mountain

Mine Type/Commodities: Hardrock/Gold, Silver, Lead

Activity Status: Active___,Inactive/Exploration X ,Abandoned___.

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Beaverhead National Forest.

Relationship to other mines/sites in the area/district: Smuggler mine is located two miles downgradient on Mill Creek.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 8400' , Slope Avg. 15° , Aspect West

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? Approx. 4 acres.
Dimensions:

Predominant vegetation types: Aspen, pine

Access: roads - good X ,poor___,4wd___,trail___.
Other logistical considerations (proximity to other sites).
Locked gate at the Mill Creek crossing

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The perennial Middle Fork Mill Creek lies south of WR-1 at Uncle Sam mine. The creek flows west-southwest past the mine and to confluence with North Fork Mill Creek 1/2 mile below the site and to confluence with South Fork Mill Creek 1 mile below the mine. Mill Creek flows 10 miles from the site to confluence with the Ruby River outside of the town of Sheridan.

Mining/milling history, ore type/tenor, host rock, gangue: The mine has an unknown starting date, but operations ceased in WWII, with some exploration since then. The vein deposit is fault controlled with either free gold or auriferous pyrite, possible has a footwall of vein on marble. Tenor is reported as 0.10 to 0.40 oz/ton of gold in recent sampling.

Mine Operation?
Shafts - Yes X, No ___, # 4, Comment 3 closed with locked doors; 1 caved
Adits - Yes ___, No X, # ___, Comment
Pits - Yes ___, No X, # ___, Comment
Placers - Yes ___, No X, # ___, Comment
Other - Yes ___, No X, # ___, Comment

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

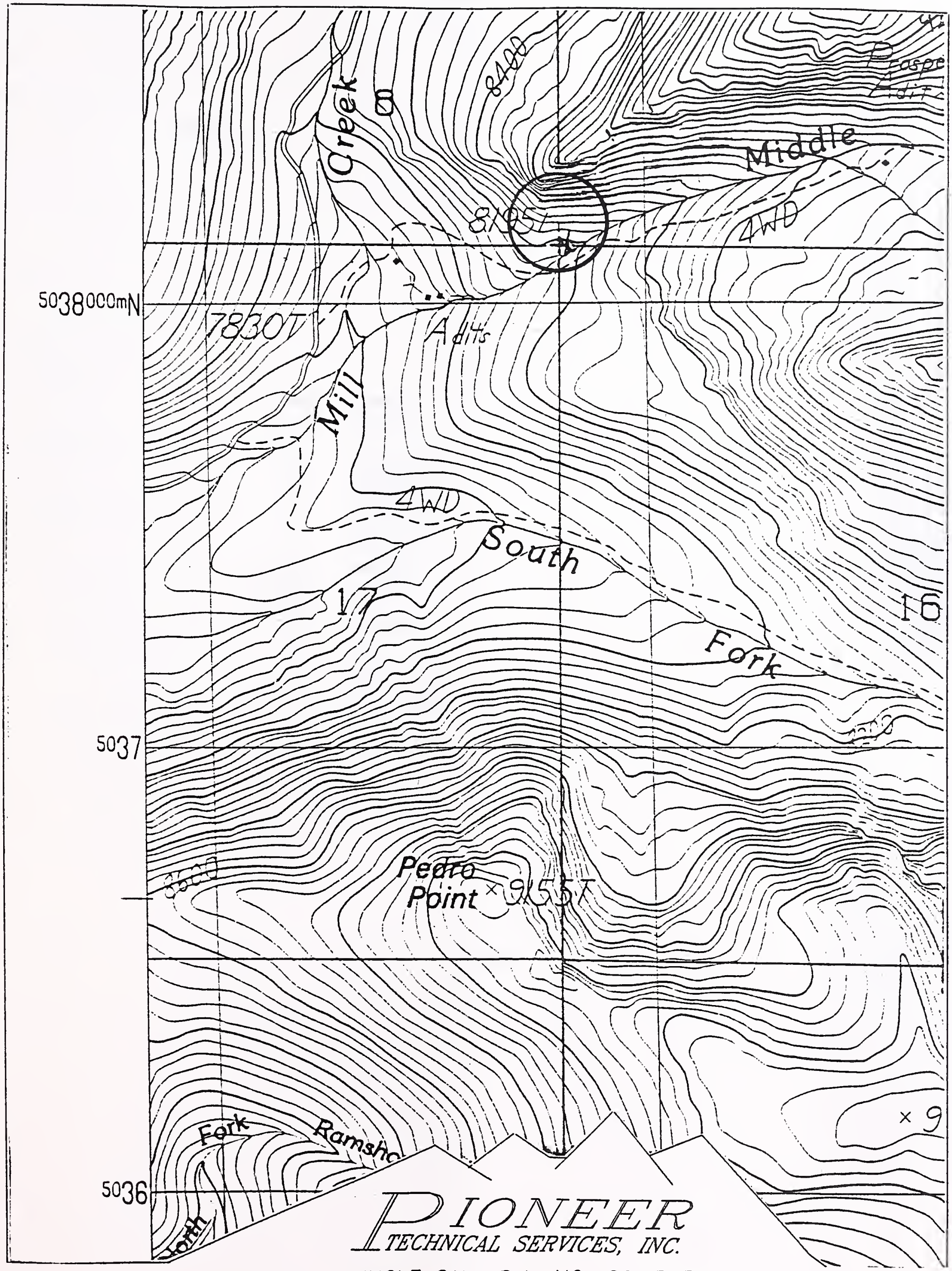
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN$^-$ leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

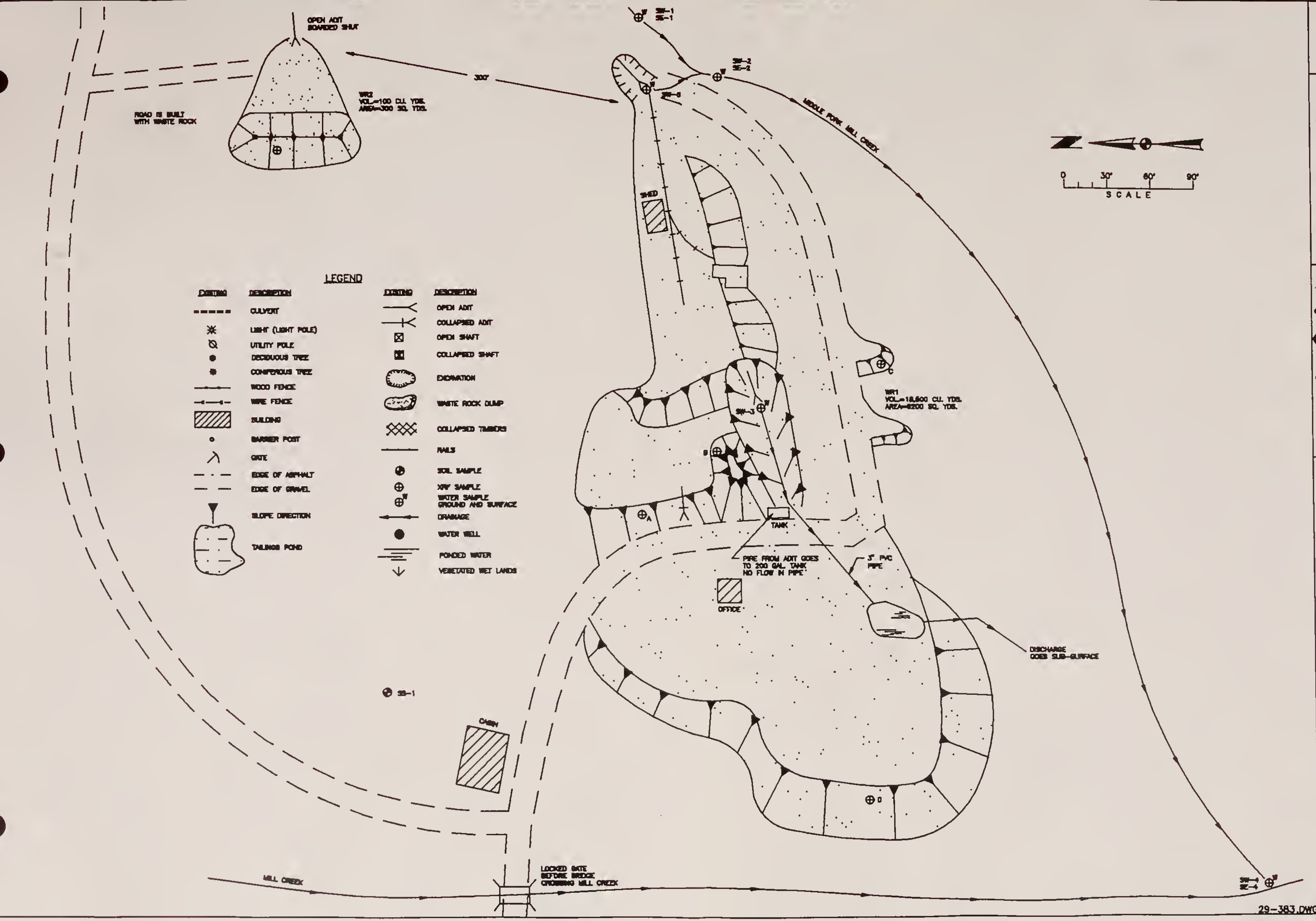
ll No.	Location	Depth	Yield	Static Water Level
M:107786	04S 03W 16 AA	61.0	6.0	10.00



PIONEER
TECHNICAL SERVICES, INC.

UNCLE SAM, P.A. NO. 29–383

T04S, R03W, SECTION 16
SCALE: 1″ = 1000′



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

UNCLE SAM PA# 29-383
SHERIDAN DISTRICT MADISON COUNTY

PIONEER

DRAWN JTP DATE 19 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

TDH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

29-383.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	18,500	North side of Dump 1	None	6.8 (D)	0.03	29-383-WR-1	06/16/93 1150	T-Metals, ABA
WR-1B	WR		Middle of Dump 1	None	6.8 (D)	0.05			
WR-1C	WR		South side of Dump 1	None	6.0 (D)	0.04			
WR-1D	WR		West side of Dump 1	None	6.8 (D)	0.04			
WR-2	WR	100	North side of Dump 2	None	6.8 (D)	0.04	29-383-WR-2	06/16/93 1600	T-Metals, ABA
SS-1	BKGRND	N/A	Background soil	N/A	7.0 (D)	0.05	29-383-SS-1	06/16/93 1010	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-383-WR-1 is composite of WR-1A through -1D.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes X, No ___, Number: 2 Identification: Upper and lower adits at WR-1

Filled shafts: Yes ___, No X, Number: ___ Identification: ___

Seeps/Springs: Yes ___, No X, Number: ___ Identification: ___

Groundwater wells within 4 miles?: Yes X, No ___;
Number of well logs: 4

Distance to nearest well used for drinking? 2 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite ____, Probable ____, Possible X, Unlikely ____.
Adit discharge with low pH; metal values in dumps is slightly elevated

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits, Pierson

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Lower adit discharge in Middle Fork Mill Creek above confluence with Mill Creek	0.104 cfs (M)	3.29	540	430	NM	547	N/A	29-383-SW-3	06/16/93 1240	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-5	AD	Upper adit discharge	< 1 cfs (E)	4.95	390	208	NM	20	N/A	29-383-SW-5	06/16/93 1315	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): Adit samples were not collected at discharge point because both adits had locked doors. NM = Not measured due to temperature probe not working properly.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes_X__, No___, Name(s): Middle Fork Mill Creek

Dry streambeds: Yes____, No_X_, Name(s):

Other surface water: Yes_X__, No___, Name(s)/Description: Mill Creek; ponded water on WR-1 from lower adit discharge

Waste materials within any floodplain: Yes_X__, No___ Source ID(s): Parts of WR-1 are in Middle Fork Mill Creek.

Approximate Flood frequency?_X_1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? 6.5 during investigation
High Flow: 40 cfs , Average Flow: 4 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet between WR-1 and Middle Fork Mill Creek.

Surface water draining onto or through waste sources: Yes____, No_X__,
Describe:

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetland, agriculture; Ruby River has fishery, recreation, irrigation, and agriculture.

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X___, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
No turbidity noted; upper adit at WR-1 discharge reaches the Middle Fork of Mill Creek.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Pierson

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	Upgradient on Middle Fork Mill Crk.; 100' above upper adit dump 1	7.94	500	234	NM	135	6.5 cfs (M)	29-383-SW-1	06/16/93 1305	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-1	SE	Upgradient on Middle Fork Mill Crk.; 100' above upper adit dump 1	N/A	N/A	N/A	N/A	N/A	N/A	29-383-SE-1	06/16/93 1305	T-Metals
SW-2	SW	Downgradient of upper adit discharge into Mill Crk. (PPE for upper adit discharge)	7.65	540	124	NM	150	6.5 cfs (M)	29-383-SW-2	06/16/93 1155	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-2	SE	Downgradient of upper adit discharge into Mill Crk. (PPE for upper adit discharge)	N/A	N/A	N/A	N/A	N/A	N/A	29-383-SE-2	06/16/93 1155	T-Metals
SW-4	SW	Approx. 600 feet downgradient of WR-1	8.11	40	404	3.2	147	6.5 cfs (M)	N/A	N/A	Field Parameters
SE-4	SE	Approx. 600 feet downgradient of WR-1	6.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	XRF Analysis

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not measured due to temperature probe not working properly; pH and Eh were taken approx. 1 hour after collected.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
$pH \leq 5.0$	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes___, No X , Describe: Carbonate rocks may be present in the area as host rocks, but none were identified on-site.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3	Wet	82,800	82,800	No	Moderate to Low
WR-2	SO3	Dry	2,700	2,700	No	Moderate to Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_None_

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads?_Locked gate at entrance_

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium___, Low_X_
Wetlands Frontage - High___, Medium___, Low_X_
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _4_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No_X_, Number____, types and locations:___

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____,
types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1_, types and locations:_Dump sloughing into Middle Fork Mill Creek._

Fire and/or Explosion hazards: Yes_X_, No___, Explain:_One case of Gelmax dangerous explosives found, although saturated by rain._

Bibliography

Koval Resources Ltd, The Uncle Sam Project, Report prepared for Shareholders of the Company, 1990.

MBMG, Uncle Sam Mine, Madison County, Form 39, 1976-1988.

MBMG, Well Log Database, September 8, 1993.

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MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Uncle Sam, Prepared by Chen-Northern, August 3, 1989.

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USGS, Topographic Map, Ramshorn Mountain, Montana, 7 1/2 minute Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

UNCLE SAM
PA NO. 29-383

Uncle Sam PA# 29-383
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 06/16/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29–383–SE–1	23	97.7	1 UJX	21.9	71.8	42.3	23000	0.03 U	579	62	20	7 UJ	65	NR
29–383–SE–2	62	28.4	2.5 JX	17.2	42.4	86.9	28700	0.021	456	55	68	4 UJ	216	NR
29–383–WR–1	258	13.8	4.9 JX	28.2	10.8	261	50200	0.473	470	77	443	4 UJ	494	NR
29–383–WR–2	3 U	63.5	0.8 JX	16	62.4	54.6	18100	0.013 U	226	49	15	3 UJ	39	NR
BACKGROUND	20	96.4	1.2 JX	20.2	42.1	35.1	18200	0.017 U	608	59	25	4 UJ	61	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29–383–WR–1	1.82	56.9	40.5	–16.	0.16	1.01	0.65	31.6	8.91
29–383–WR–2DUP	0.01	0.31	9.59	9.28	<0.01	<0.01	0.01	0	9.59
29–383–WR–2	0.03	0.94	10.1	9.21	0.01	<0.01	0.02	0	10.1

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29–383–SW–1	1.69 U	6.57	2.55 U	5.99 U	5 U	1.35 U	26.8	0.19	2.6 U	8.78 U	1.55 U	18.3 U	6 U	16.2
29–383–SW–2	1.69 U	7.17	2.55 U	5.99 U	5 U	3.23 J	277	0.2	19.9	8.78 U	1.55 U	18.3 U	37.3	18.2
29–383–SW–3	4.18	3.8	19.3	34.5	5 U	114 J	2550	0.18	869	104 J	16.9	19.2	1240	220
29–383–SW–5	7.34	7.7	22.8	41.9	6.97	69.9 J	5490	0.26	1290	212 J	18.8	18.3 U	2090	163

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2–N	CYANIDE
29–383–SW–1	56	< 5.0	6	0.09	NR
29–383–SW–2	58	< 5.0	8	0.06	NR
29–383–SW–3	306	< 5.0	163	0.15	NR
29–383–SW–5	284	< 5.0	181	< 0.05	NR

LEGEND

SE1 – Upgradient on Middle Fork Mill Creek; 100' above upper adit dump 1.
SE2 – Downgradient of upper adit discharge into Mill Creek. (PPE for upper adit discharge).
WR1 – Composite of subsamples WR1A, 1B, 1C, and 1D.
WR2 – Sample of the subsample WR2.
WR2DUP – Duplicate of sample 29–383–WR–2.
BACKGROUND – From the Uncle Sam Mine (29–383–SS–1).

SW1 – Same as SE1.
SW2 – Same as SE2.
SW3 – Lower adit discharge in Middle Fork Mill Creek above confluence with Mill Creek.
SW5 – Upper adit discharge.

XRF ANALYSIS RESULTS

UNCLE SAM
PA NO. 29-383

Mine Name: Uncle Sam PA# 29-383
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-383-SE-4			13094.9	2033.23	176.035 *	790.989 *	31186.8			98.6594 *		273.122
29-383-SS-1			12894.6	2790.83	148.758 *	897.889 *	29927					317.637
29-383-WR1-A		50664.4	13689.4	7112.42		1748.02 *	45723.6		147.855 *	429.607	135.161 *	165.383
29-383-WR1-B		43203.6	2076.05	6934.11			55494.2		196.316 *	171.931 *	595.663	117.516
29-383-WR1-C			5735.35	5371.62		1164.76 *	48590.4		183.454 *	690.33	82.1332 *	245.657
29-383-WR1-D			1755.98	5188.69			74375.7		124.307 *		416.529	95.5155
29-383-WR2-A			20805.9	2464.11	182.211 *	922.91 *	41560.7					499.759
29-383-WR-1-COMP			2601.46	5453.14			64992		179.745 *	339.468	342.437	154.291

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-383-SE-4	107.036			22.3762 *	55.6413			295.976	61.8138 *		
29-383-SS-1	163.337				61.0972			376.246			
29-383-WR1-A	180.564				186.441			259.854	153.696 *		
29-383-WR1-B	210.084			672.565	190.495			422.701	140.076 *		
29-383-WR1-C	157.589			229.917	197.91	188.274 *		296.828	101.592 *		
29-383-WR1-D	184.073			590.521	193.967			365.787	109.725 *		
29-383-WR2-A	194.094				47.2683 *			619.089	102.587 *		
29-383-WR-1-COMP	198.134			532.657	195.841			357.543	184.782 *		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

UNCLE SAM
PA NO. 29-383

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

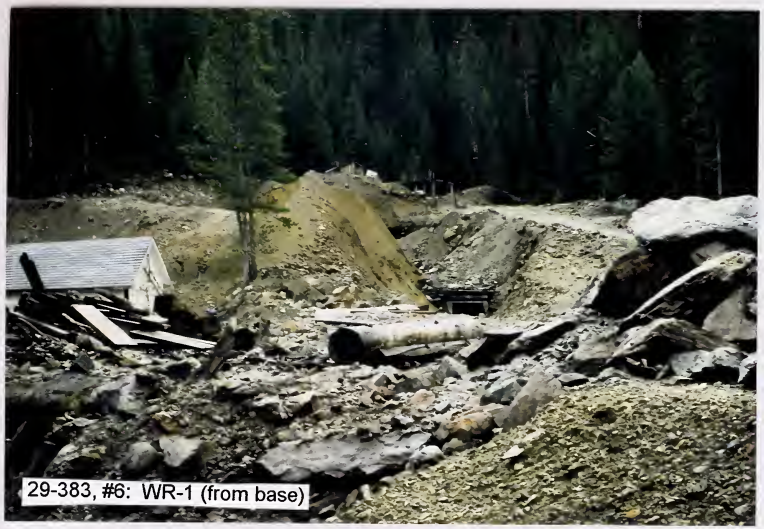
SITE NAME: UNCLE SAM
PA NUMBER: 29-383

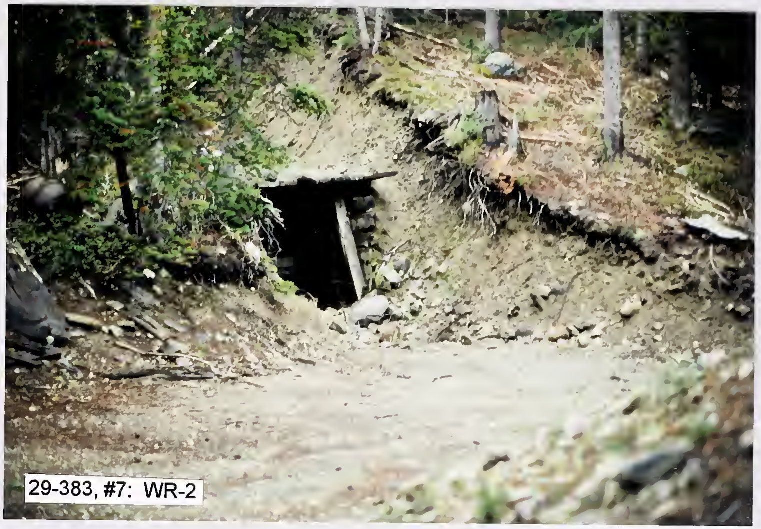
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	20.588
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		3
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	5.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	45294
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	21.964
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	18
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	296514
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.076
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		0
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	10
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	57
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		5
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	25
38		LIKELIHOOD SCORE	LINES 36 + 37C	25
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.068
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**3.42**

SITE NAME: UNCLE SAM
PA NUMBER: 29-383

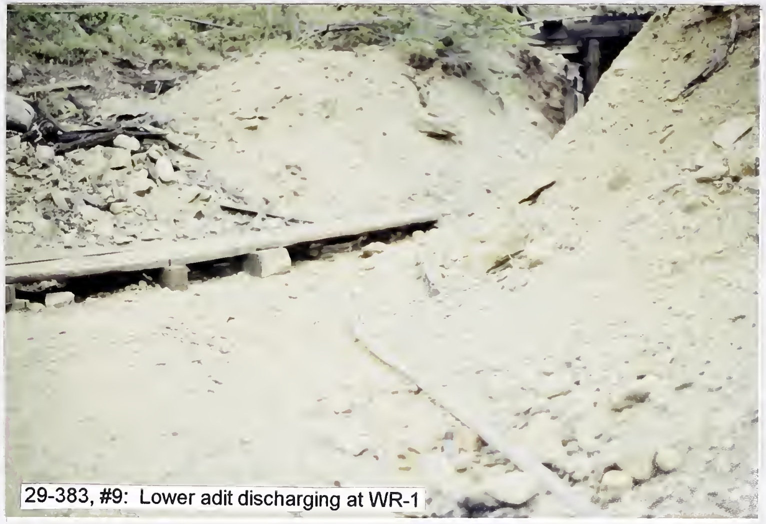
SITE SAFETY

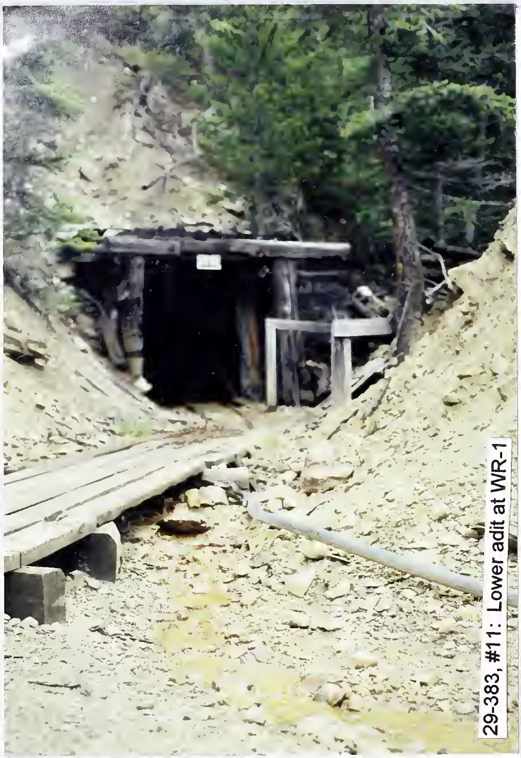
LINE NO.				
1	THREAT	ACCESSIBILITY		5
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		50
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	50
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**


29-383, #6: WR-1 (from base)

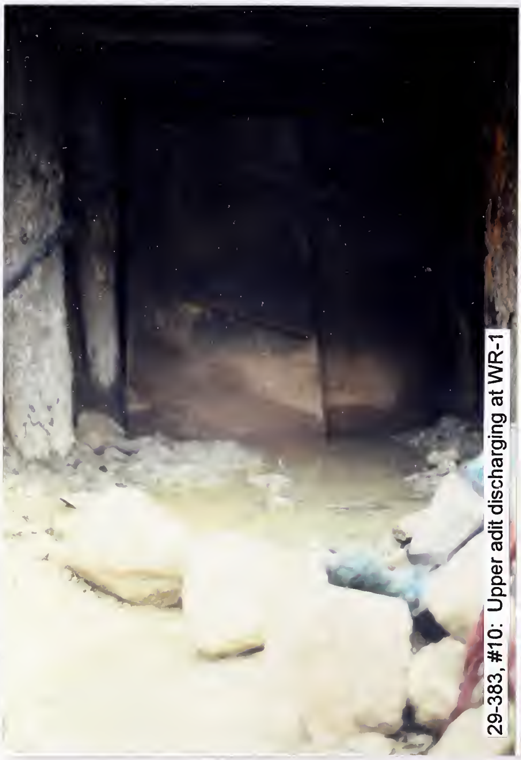

29-383, #7: WR-2

29-383, #8: Confluence of Middle Fork Mill Creek and Mill Creek


29-383, #9: Lower adit discharging at WR-1



29-383, #11: Lower adit at WR-1



29-383, #10: Upper adit discharging at WR-1

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: LAKESHORE PA#: 29-436

Date: July 21, 1993 Time: 0900

Field Team Leader: Babits, Pioneer

Sampling Personnel: Pierson, TD&H
Lasher, Pioneer

Visitors: Rick Berger, MDSL

Weather/Seasonality Observations: Cool (45°-50°F); overcast; slight breeze (5 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #7: WR-1, Crystal Lake, and collapsed mill. No video taken.

General Comments/Observations (not covered specifically in attached Inventory Forms): This site is also referred to as the "Gladstone" mine.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Berm waste rock from lake; dredge tailings from lake. Adit discharge is near neutral pH and does not contain elevated metals levels.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): LAKESHORE PA#: 29-436

Legal Description: T 3S ;R 4W ;Sec. 8 , SE1/4 SE1/4 ___1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 35' 00" Longitude: W 112° 07' 00"

Primary Drainage Basin and Code: Wisconsin Creek/10020003
Secondary Drainage Basin: Crystal Lake

USGS Quadrangle map name(s): Noble Peak

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Gary Garrett, P.O. Box 60763, Savannah, GA 31419. (912) 925-2063; Beaverhead National Forest.

Relationship to other mines/sites in the area/district: There are mines continuing up the Wisconsin Creek drainage.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 8500', Slope Up to 20°, Aspect West

Land use: Mining___, Recreational X , Residential___, Urban___, Agricultural___, Other(Specify)___

Area of disturbed/unvegetated lands? Approx. 4 acres.
Dimensions:___

Predominant vegetation types: Pine, fir

Access: roads - good___,poor___,4wd X ,trail___.
Other logical considerations (proximity to other sites).___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies on the bank of Crystal Lake; at the headwaters of Wisconsin Creek. Site is underlain by gneisses and schists.

Mining/milling history, ore type/tenor, host rock, gangue: Unknown history. Vein is quartz and pyrite with some arsenopyrite and chalcopyrite; gneiss is country rock.

Mine Operation?

Shafts - Yes___, No_X_, # ____, Comment

Adits - Yes_X_, No___, # _5_, Comment 3 open; 1 discharging

Pits - Yes___, No_X_, # ____, Comment

Placers - Yes___, No_X_, # ____, Comment

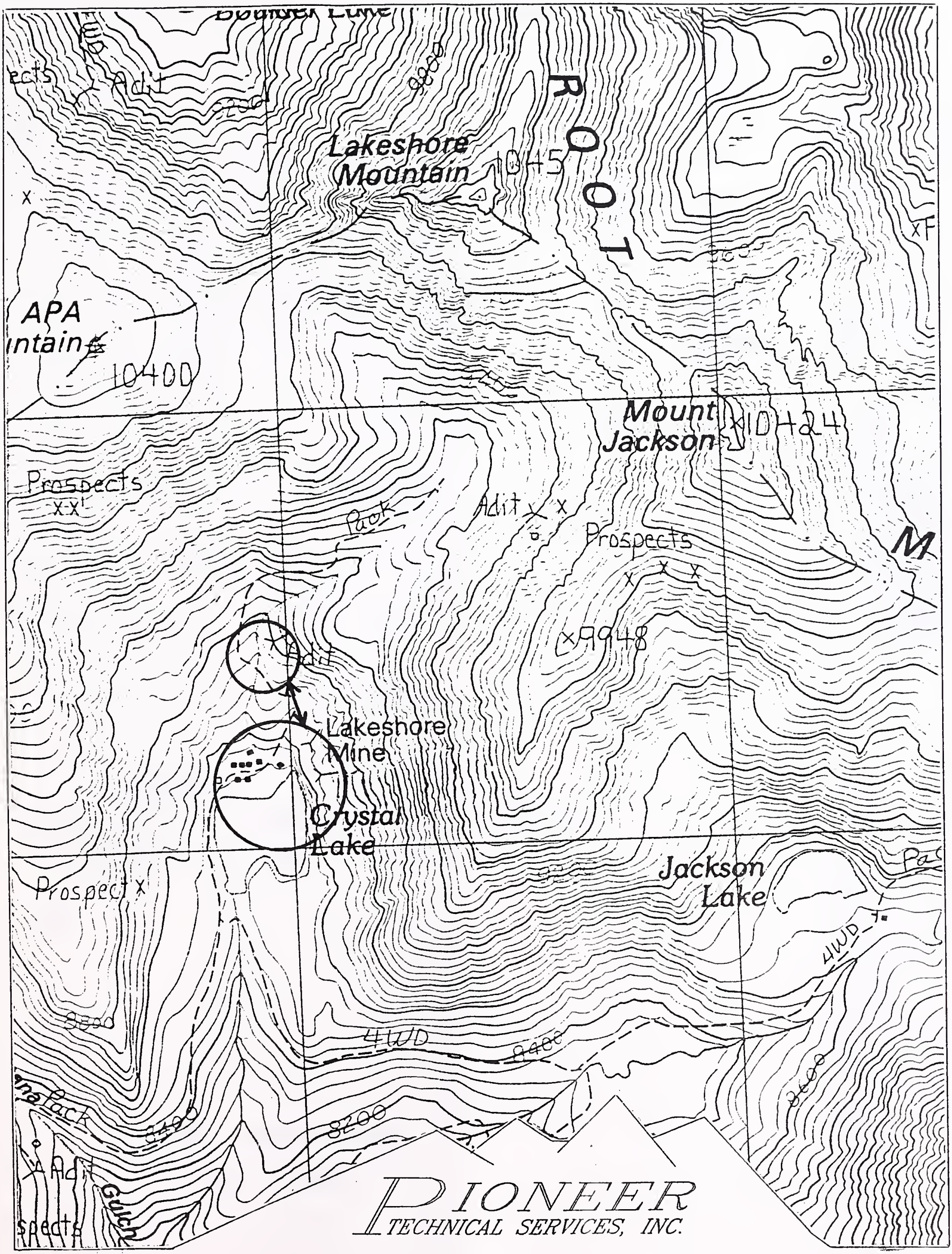
Other - Yes___, No_X_, # ____, Comment

Mill Operation? Yes_X_, No____. If yes answer the next three questions:

Period(s) of Operation: Unknown

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? 10-stamp mill with plates and concentrators

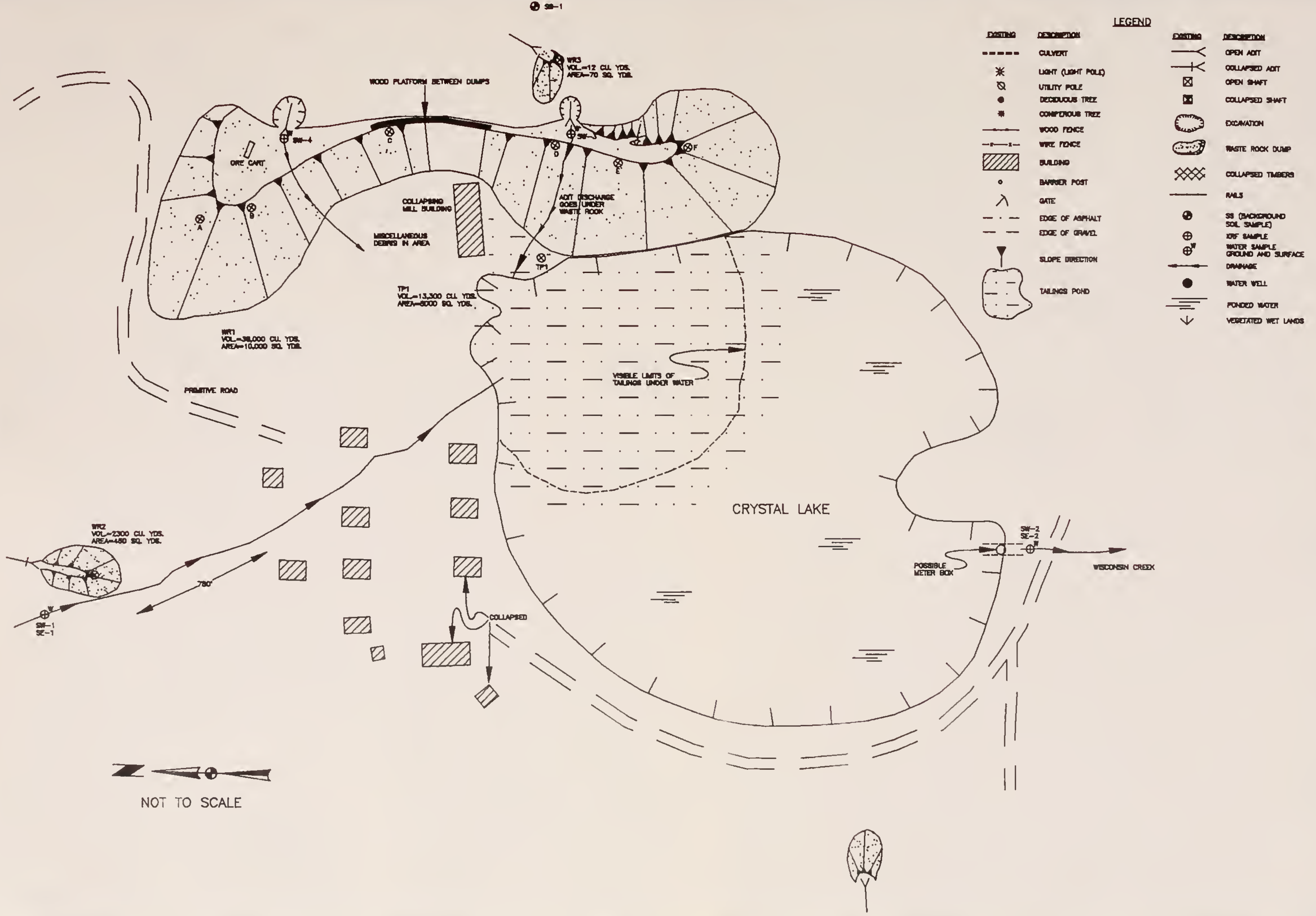


PIONEER
TECHNICAL SERVICES, INC.

LAKESHORE, P.A. NO. 29-436

T03S, R04W, SECTION 08

SCALE: 1" = 1000'



DRAWN JTP DATE 21 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER
TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS—BOZEMAN—KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

LAKESHORE PA# 29-436
SHERIDAN DISTRICT MADISON COUNTY

SHEET NO.

29-436.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Sand with clay lenses

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): No impoundments; tailings are in Crystal Lake. Approx. one-third of Crystal Lake has tailings in bed.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Wet

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): None

Comments on potential for mitigation: Dredge lake

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A	TAIL	13,300	By northeast corner of lake below WR-1; 0-1.5', orange sand	None	NM	NM	29-436-TP-1	07/21/93 2000	T-Metals, ABA, CN-
TP-1B	TAIL		By northeast corner of lake below WR-1; 1.5'-3', light orange sand	None	NM	NM			
TP-1C	TAIL		By northeast corner of lake below WR-1; 3'-7.5', gray sand with clay	None	NM	NM			
WR-1A	WR	36,000	North end of WR-1 off knob, 1/2 way down	None	6.8 (D)	0.04	29-436-WR-1	07/21/93 1830	T-Metals, ABA
WR-1B	WR		Northwest end of WR-1, just off of top	None	6.5 (D)	0.04			
WR-1C	WR		Northeast of mill building, east of furnace, on top of WR-1	None	6.4 (D)	0.04			
WR-1D	WR		North of adit, west side of WR-1, near top	None	5.6 (D)	0.04			
WR-1E	WR		Southwest end of WR-1, south of adit, on top	None	6.5 (D)	0.05			
WR-1F	WR		South end of WR-1, on top	None	5.6 (D)	0.04	29-436-WR-2	07/21/93 1835	T-Metals, ABA
WR-2	WR	2,300	1,160 feet up creek from lake, off knob	None	7.0 (D)	0.04	29-436-WR-3	07/21/93 1840	T-Metals, ABA
WR-3	WR	12	Above southern adit, on southeast corner	None	6.6 (D)	0.05			
SS-1	BKGRND	N/A	Background soil above WR-3	N/A	7.0 (D)	0.04	29-436-SS-1	07/21/93 1225	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-436-TP-1 is composite of TP-1A through -1C. 29-436-WR-1 is composite of WR-1A through -1E and WR-3. 29-436-WR-2 is a grab of WR-1F. 29-436-WR-3 is a grab of WR-2. NM = Not Measured.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes_X_, No___, Number:_2_ Identification:_Both at WR-1_

Filled shafts: Yes___, No_X_, Number:___ Identification:___

Seeps/Springs: Yes_X_, No___, Number:_1_ Identification:_Near cabins_

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs:_2_

Distance to nearest well used for drinking?_2 miles_

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite___, Probable_X_, Possible___, Unlikely___.
Uncontained sources; shallow aquifer; some elevated metals in dumps.

Other observations/notes:_N/A_

GROUNDWATER INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	AD	Southern adit discharge at WR-1	7 gpm (E)	7.97	NM	521	3.8	59	N/A	29-436-SW-3	07/21/93 0925	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SW-4	AD	Northern adit discharge at WR-1	7 gpm (E)	7.92	NM	263	3.8	59	N/A	29-436-SW-3	07/21/93 2030	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not measured due meter malfunction.

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X , No ___, Name(s): Wisconsin Creek

Dry streambeds: Yes ____, No X , Name(s): ____

Other surface water: Yes X , No ___, Name(s)/Description: Crystal Lake

Waste materials within any floodplain: Yes X , No ___ Source ID(s): TP-1 and WR-1 in Crystal Lake; WR-2 in Wisconsin Creek.

Approximate Flood frequency? X 1 yr, ___10 yr, ___100 yr

Estimated seasonal flow of stream(s) (cfs)? Wisconsin Creek 3 cfs
High Flow: 40 cfs , Average Flow: 4 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet

Surface water draining onto or through waste sources: Yes X , No ____,
Describe: Northern and southern adit at WR-1 flow through WR-1.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, fishery, wetland

Observed erosional/sedimentation/stream turbidity problems? Yes _____, No X , Distance downstream (ft)? ________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-1	SW	20 feet upstream from WR-2	8.00	NM	230	3.8	22	3 cfs (M)	29-436-SW-1	07/21/93 1105	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-1	SE	20 feet upstream from WR-2	N/A	N/A	N/A	N/A	N/A	N/A	29-436-SE-1	07/21/93 1105	T-Metals
SW-2	SW	20 feet downstream from culvert at south end of Crystal Lake	8.03	NM	242	7.9	22	3 cfs (M)	29-436-SW-2	07/21/93 1010	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3, CN-
SE-2	SE	20 feet downstream from culvert at south end of Crystal Lake	N/A	N/A	N/A	N/A	N/A	N/A	29-436-SE-2	07/21/93 1010	T-Metals, CN-

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not measured due to meter malfunction.

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes X, No ___, Describe: Marsh

Carbonate rocks/soils: Yes X, No ___, Describe: Carbonate precipitate on rocks.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 X ; 10-30 ___; 30-100 ___; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments

Nearest residence(ft or miles)? 2 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO3	Moist	90,000	90,000	Yes	Moderate
WR-2	SO3	Moist	4,050	4,050	Yes	Moderate
WR-3	SO3	Moist	630	630	Yes	Moderate
TP-1	None	Wet	72,000	72,000	Yes	Moderate

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:____________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments_None____

Evidence of recreational use on site: Yes___, No_X_, Describe:________

Accessibility - Fences, warning signs, closed roads?_Unrestricted___

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes___, No_X_, Comment________
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High_X_, Medium___, Low___
Wetlands Frontage - High___, Medium_X_, Low___
Fisheries Habitat and Species Classification - _5_
Sport Fishery Classification - _5_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_3_, types and locations:___
Adits

Hazardous structures: Yes_X_, No___, Number_5_, types and locations:_
Buildings

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes____, No_X_, Number____, types and locations:________

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Lakeshore, Prepared by Chen-Northern, September 24, 1989.

USGS, Topographic Map, Noble Peak, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

LAKESHORE
PA NO. 29-436

Lakeshore PA# 29-436
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – BABITS
INVESTIGATION DATE: 07/21/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-436-SE-1	11.9	37.5	1.2	9.41	23.7	20.3	12300	0.063 J	271 J	17.6	14.6	6.66 U	41	NR
29-436-SE-2	102	223	9.7	31	54.9	191	32500	0.825 J	3910 J	42	322	18.9 U	686	0.783 U
29-436-TP-1	186	28.8	1.4	4.8	8.36	587	38200	5.18 J	121 J	9.06	1330	16.4	511	0.326 U
29-436-WR-1	15.1	89.3	0.6	17.2	38.8	87	28600	0.701 J	601 J	40.6	47.8	4.63 U	108	NR
29-436-WR-2	307	24.6	47.6	5.36	7.94	379	62300	0.27 J	72.2 J	7.62	3500	25.6	8720	NR
29-436-WR-3	41.3	45.9	1.3	12.9	26	101	23100	0.127 J	423 J	19.8	768	6.22 U	302	NR
BACKGROUND	103	94	1.8	19.8	100	57.4	34300	1.23 J	606 J	61.4	31.9	16.9	70.6	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-436-WR-1	0.64	20	36.9	16.9	0.05	0.3	0.29	9.37	37.6
29-436-WR-2	1.87	58.4	-1.5	-60	1.58	0.08	0.21	2.5	-4.07
29-436-WR-3	0.04	1.25	3.12	1.87	0.02	<0.01	0.02	0	3.12
29-436-WR-3DUP	0.04	1.25	3.28	2.03	0.02	<0.01	0.02	0	3.28

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29-436-SW-1	1.69 U	8.63	2.57 U	9.7 U	6.83 U	1.55 U	14.8	0.038 U	4.08 U	12.7 U	1.55 U	30.7 U	7.57 U	25.5
29-436-SW-2	1.38	11.5 JX	2.57 U	9.7 U	10.5 J	9.23 J	72.9 J	0.038 U	4.08 U	12.9	0.72 U	30.7 U	10.4 J	32.8
29-436-SW-3	2.29	18.4 JX	2.57 U	9.7 U	7.07 J	6 J	72.8 J	0.038 U	4.13	12.7 U	0.72 U	30.7 U	29.2 J	96.6
29-436-SW-4	1.32	2.01 UX	2.57 U	9.7 U	6.83 U	1.55 U	17 J	0.038 U	4.08 U	12.7 U	0.72 U	30.7 U	7.57 U	0.1

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2-N	CYANIDE
29-436-SW-1	93	< 5.0	9	0.08	< 0.00
29-436-SW-2	72	< 5.0	11	< 0.05	< 0.00
29-436-SW-3	150	< 5.0	38	0.1	NR
29-436-SW-4	NR	NR	NR	NR	< 0.00

LEGEND

- SE1 – 20 feet upstream from waste rock dump 2.
- SE2 – 20 feet downstream from culvert at South end of Crystal Lake.
- TP1 – Composite of subsamples TP1A, 1B, and 1C.
- WR1 – Composite of subsamples WR1A, 1B, 1C, 1E, and 3.
- WR2 – Sample of the subsample WR1F.
- WR3 – Sample of the subsample WR2.
- WR3DUP – Duplicate of the sample 29-436-WR-3.
- BACKGROUND – Above waste rock dump 3. From the Lakeshore Mine (29-436-SS-1).
- SW1 – Same as SE1.
- SW2 – Same as SE2.
- SW3 – Southern adit discharge at waste rock dump 1.
- SW4 – Northern adit discharge at waste rock dump 1.

XRF ANALYSIS RESULTS

LAKESHORE
PA NO. 29-436

Mine Name: Lakeshore PA# 29-436
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-436-SS-1			14229.2	2023.34	197.252 *	1646.42	44753.5			121.339 *		165.781
29-436-TP1-A			3907.43	2394.35		292.418 *	34241.6		164.074 *	163.237		60.4671
29-436-TP1-B			3682.01	2561.5			45111.3	353.154 *	516.565	497.5		93.6217
29-436-TP1-C			12751	1415.96		494.462 *	17607.7		95.3485 *	89.9337 *		101.394
29-436-TP-1-COMP			3906.31	2986.05			41660.1		463.336	354.492		85.1187
29-436-WR1-A		29691.1	14206.8	1892.56		803.882 *	23172.1			85.9802 *		156.472
29-436-WR1-B		10836.3	25542.6	1830.93		751.585 *	19825.1			92.4353 *		324.802
29-436-WR1-C			8792.09	1388.33		1043.06 *	65672.5		55.1237 *	100.846 *		175.753
29-436-WR1-D			16886.1	2847.73		1524.39	33545.5		154.286 *	149.685 *		220.648
29-436-WR1-E			18852.3	1954.58		1476.24	35431.4		152.006 *	241.407	37.7552 *	188.723
29-436-WR1-F			16322.5	2523.54			74399.9		286.558	227.357	188.233 *	141.488
29-436-WR-1-COMP			16683.1	2220.67		843.17 *	32318.4		57.1478 *	237.832		165.59
29-436-WR-2			9197.8	1683.94		519.005 *	29630.3		125.391 *	370.761		223.439
29-436-WR-3			1693.36	1594.58		1235.76 *	67649.6		124.719 *	58.9864 *		42.0329

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-436-SS-1	90.7071			37.7889 *	142.668			262.562			
29-436-TP1-A	97.6635			494.627	106.368			143.31			
29-436-TP1-B	83.9699			1222.41	230.556		52.1366 *	206.106			
29-436-TP1-C	69.7567			164.859	161.921			333.36			
29-436-TP-1-COMP	94.4074			1044.7	177.548			217.064			9.17362 *
29-436-WR1-A	119.456			16.6187 *	160.263			523.175	137.344 *		
29-436-WR1-B	114.542			17.1104 *	49.6863			329.33			
29-436-WR1-C	113.2	54.1684 *		51.0742 *	209.266			352.866			
29-436-WR1-D	138.608			50.7685 *	85.9238		54.9168 *	236.396			10.2125 *
29-436-WR1-E	102.983			78.0808	86.0513			273.083	77.4042 *		6.72693 *
29-436-WR1-F	156.054			1666.87	106.991	158.004 *	57.1663 *	261.444			
29-436-WR-1-COMP	126.217			47.2039 *	100.562			322.358			
29-436-WR-2	107.008			705.078	106.891			389.197			
29-436-WR-3	153.986			48.941 *	231.591			378.468	104.933 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

LAKESHORE
PA NO. 29-436

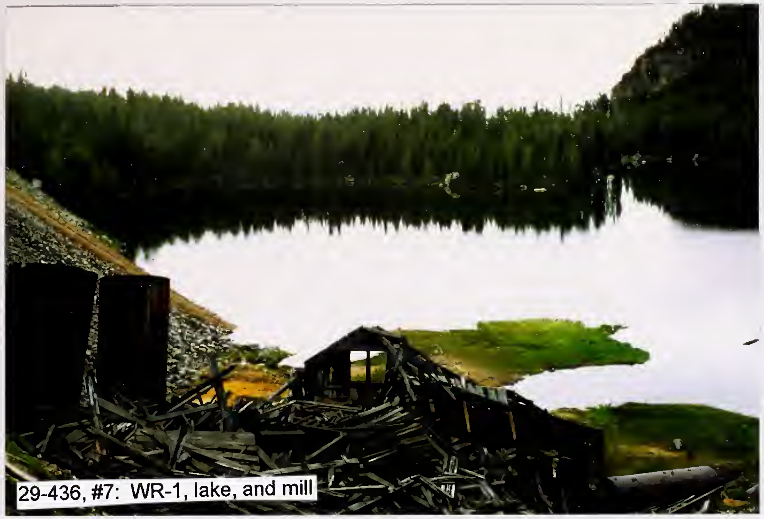
AIMSS SCORESHEET

SITE NAME: LAKESHORE MINE
PA NUMBER: 29-436

LINE NO.				
		GROUNDWATER PATHWAY		
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	27.375
6		WELLS - 1 MI. x 2.5		0.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		2
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	2.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	21900
		SURFACE WATER PATHWAY		
11		OBSERVED RELEASE		300
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		50
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	750
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	30.217
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		0
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	17
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	385267
		AIR PATHWAY		
25		OBSERVED RELEASE		0
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		15
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	75
27		LIKELIHOOD SCORE	LINES 25 + 26C	75
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.576
29		POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	11
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	475
		DIRECT CONTACT PATHWAY		
36		OBSERVED EXPOSURE		0
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.521
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**4.08**

SITE NAME: LAKESHORE MINE
PA NUMBER: 29-436

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	150
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	200
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	350
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**



29-436, #7: WR-1, lake, and mill

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY
SITE INVESTIGATION LOG SHEET

Mine/Site Name: BUCKEYE PA#: 29-451

Date: August 27, 1993 Time: 1000

Field Team Leader: Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
Pierson, TD&H

Visitors: None

Weather/Seasonality Observations: Warm (up to 75°F); mostly sunny; breezy (5 mph); cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #8: Adit at revegetated dump; #9: TP-1, headframe, and mill foundation; #10: WR-3; #11: WR-5. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: 55 gal. drum (outside sheet metal building, west side) is 1/3 full of unknown yellowish-clear liquid. The corroded barrel has signs of staining on the ground and the barrel has been propped up on one side to keep it from leaking more; however, the barrel is beginning to corrode on the other side. There is no label on the barrel. Another 55 gal. drum located in the building on the northwest end of the site (west end of building) is 1/3 full of unknown gray powder. Evidence of leakage is under the barrel and there is an odd odor. On the east end of the same building, there are three 55 gal. drums grouped together. The east barrel is 7/8 full of a light tan (with pink tinge) unknown powder and there is no lid or label on the barrel. The west barrel is 7/8 full of light gray powder without a lid or label. The south barrel is full of a black, fine-grained powder. There is a lid present but it is not secured. The side of this barrel is corroded near the bottom and has spilled onto the ground; it is beginning to corrode in many other places. With the three barrels, there is a 5 gal. bucket of of a dark gray unknown powder. All powder appears to be hard pack on the surface. Another 55 gal. drum is located south of the mill foundation and is 1/3 full of unknowns. At present, this barrel is upside down and painted on it is "890811". There are white evaporative salts present in between all buildings and on top of WR-4.

General Comments on Potential Remedial Alternatives: WR-5 should be prevented from eroding into Mill Creek. Waste rock could be reprocessed for lead; tailings could be reprocessed or capped and vegetated. Contents of barrel should be identified and disposed of properly.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BUCKEYE **PA#:** 29-451

Legal Description: T 4S ;R 4W ;Sec. 19 , SE1/4SE 1/4___1/4

County: MADISON **Mining District:** SHERIDAN

Latitude: N 45° 28' 15" **Longitude:** W 112° 07' 47"

Primary Drainage Basin and Code: Ruby River/10020003
Secondary Drainage Basin: Mill Creek

USGS Quadrangle map name(s): Sheridan

Mine Type/Commodities: Hardrock/Lead, Zinc, Gold, Silver, Copper

Activity Status: Active___, Inactive/Exploration___, Abandoned X .

Ownership status: Known YX N__; private/public? Private
Owner, Agent, or Contact (Include address and phone when available): Victoria Mines, Inc., c/o Jane Fisher, 3000 Conner Street #14, Salt Lake City, UT 84109; John Masbitt, Box 128, Mackay, ID 83251. (208) 526-3171.

Relationship to other mines/sites in the area/district: Numerous workings located above and below Buckeye in this drainage.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Unknown permits; all adits and shafts are backfilled and revegetated; some waste rock revegetated.

General site features: Elevation 5800', Slope 10°,
Aspect Most waste rock is south; tailings are east

Land use: Mining X , Recreational X , Residential___, Urban___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? Approx. 1.6 acres.
Dimensions:

Predominant vegetation types: Juniper, sage, grasses, mullen

Access: roads - good X , poor___, 4wd___, trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 32 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Two intermittent drainages drain small water sheds at the site; both were dry during this site visit. Mill Creek flows east to west at the base of WR-5. The site is underlain by gneiss below overlying limestone.

Mining/milling history, ore type/tenor, host rock, gangue: Mine operated intermittently from 1919 to 1983. Ore occurs in gneiss below overlying limestone. A vein of oxidized manganese ore lies parallel with gneiss.

Mine Operation?
Shafts - Yes___, No X , # _____, Comment All shafts and adits
Adits - Yes___, No X , # _____, Comment have been backfilled
Pits - Yes___, No X , # _____, Comment
Placers - Yes___, No X , # _____, Comment
Other - Yes___, No X , # _____, Comment

Mill Operation? Yes X , No____. If yes answer the next three questions:

Period(s) of Operation: 1981 to unknown

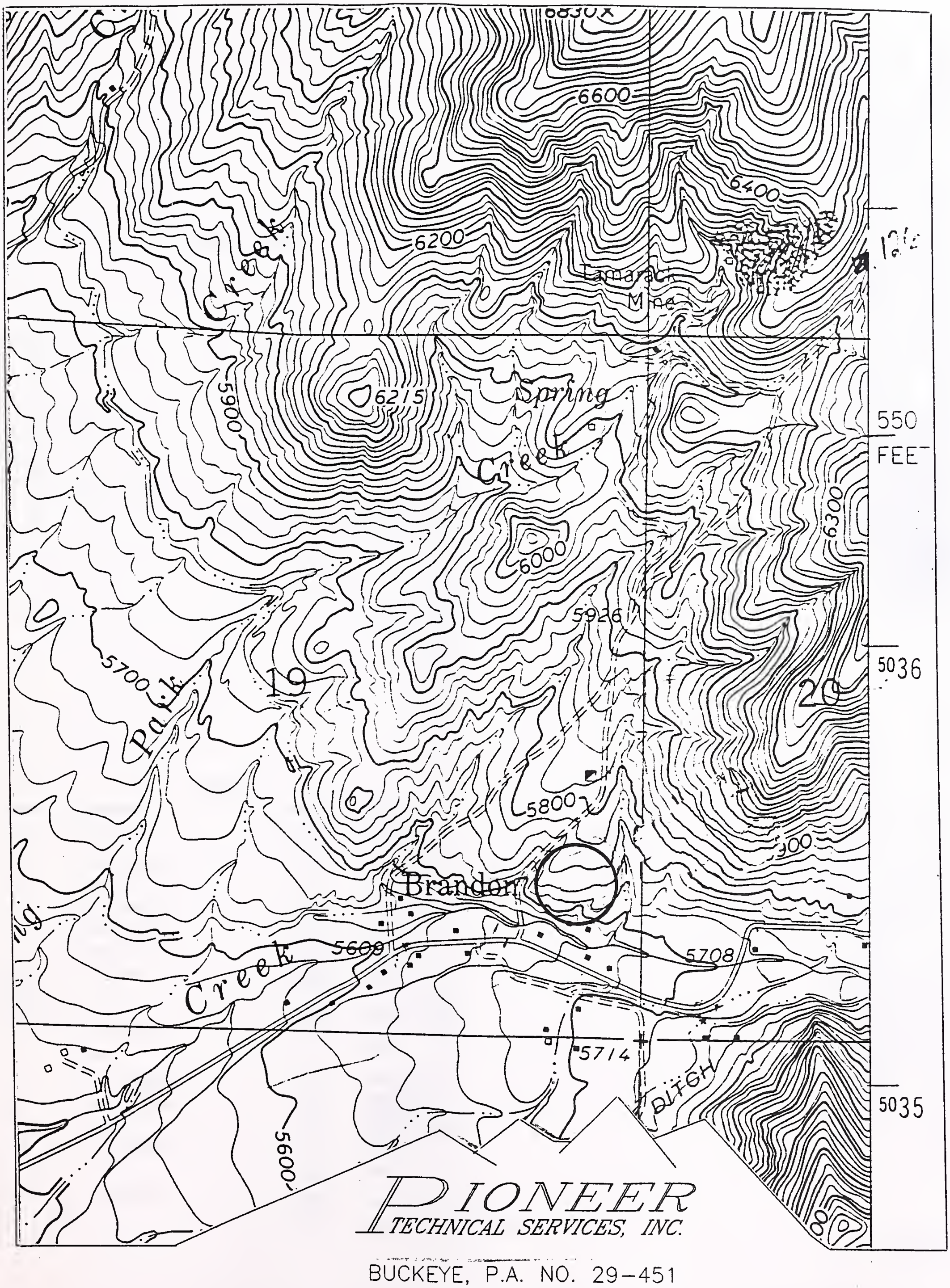
Origin of Ore Milled - Custom Mill___ Dedicated Mill X ; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
Unknown, but possibly CN- heap leach.

Montana Bureau of Mines and Geology
Water Well Log Data

11/01/1993

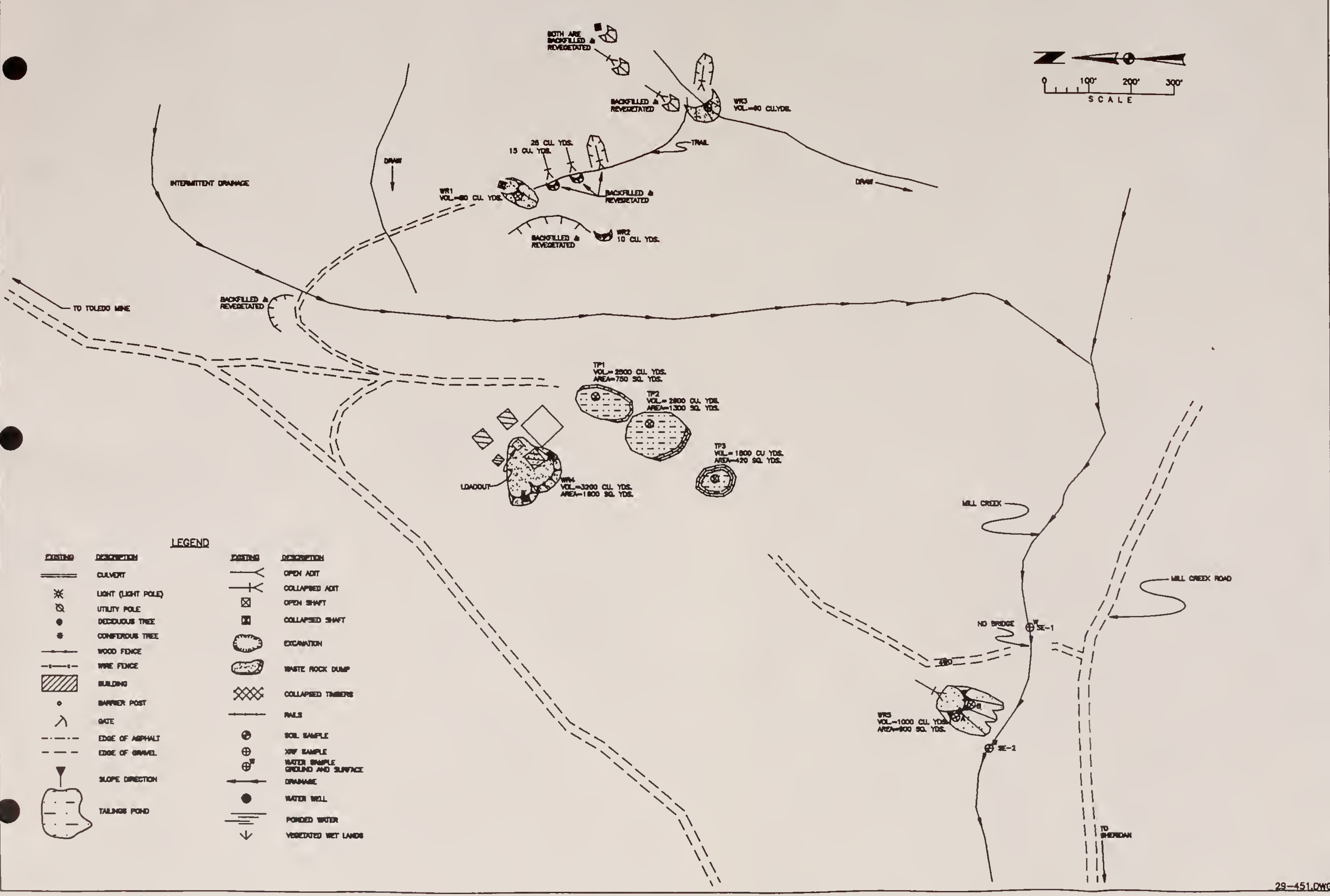
ll No.	Location	Depth	Yield	Static Water Level
M:107787	04S 04W 19 BBA	200.0	5.0	38.00
M:107788	04S 04W 19 BD	200.0	4.0	30.00
M:107791	04S 04W 19 D	30.0	8.0	10.00
M:107789	04S 04W 19 D	30.0	8.0	10.00
M:107790	04S 04W 19 D	78.0	25.0	23.00
M:107792	04S 04W 19 DB	21.0	800.0	13.00
M:107793	04S 04W 19 DBD	10.0	800.0	6.00
M:107796	04S 04W 19 DC	42.0	350.0	39.00
M:107797	04S 04W 19 DC	10.0	25.0	0.00
M:107795	04S 04W 19 DC	45.0	12.0	14.00
M:107794	04S 04W 19 DC	41.0	20.0	12.00
M:107799	04S 04W 19 DCA	19.0	2.0	0.00
M:107798	04S 04W 19 DCA	41.0	90.0	10.00
M:122644	04S 04W 19 DCD	30.0	30.0	8.00
M:107800	04S 04W 19 DD	0.0	10.0	0.00
M:107801	04S 04W 19 DDA	70.0	20.0	51.00
M:107802	04S 04W 19 DDC	0.0	10.0	0.00
M:107803	04S 04W 19 DDD	44.0	21.0	10.00
M:107804	04S 04W 20 C	59.0	25.0	15.00
M:107805	04S 04W 20 CD	95.0	12.0	45.00
M:107806	04S 04W 20 CDB	61.0	12.0	35.00
M:107807	04S 04W 20 DA	36.0	10.0	15.00
M:32010	04S 04W 20 DB	300.0	70.0	6.00
107808	04S 04W 21 BDDD	26.0	10.0	20.00
107809	04S 04W 21 DA	117.0	37.0	0.00
107814	04S 04W 30 BBC	38.0	80.0	6.00
M:107813	04S 04W 30 BBC	180.0	10.0	0.00
M:107815	04S 04W 30 BC	36.0	25.0	26.00
M:107816	04S 04W 30 BCBB	34.0	30.0	5.00
M:107817	04S 04W 30 CAC	200.0	18.0	68.00
M:107818	04S 04W 30 DB	60.0	30.0	33.00
M:107819	04S 04W 30 DBC	48.0	30.0	25.00



PIONEER TECHNICAL SERVICES, INC.

BUCKEYE, P.A. NO. 29-451

T04S, R04W, SECTION 20
SCALE: 1" = 1000'



29-451.DWG

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BUCKEYE PA#29-451
SHERIDAN DISTRICT MADISON COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN JTP DATE 27 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): Fine sand to clay

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): TP-1 has a depth of 13'; TP-2 has a depth of 6'; and, TP-3 has a depth of 13'.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Dry to moist

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): Berms of poor quality (small breaches)

Comments on potential for mitigation: Amend, coversoil, revegetate

SOURCE INVENTORY FORM

SAMPLERS: Babits, Flammang, Pierson*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	80	East side	None	5.4 (D)	0.03	29-451-WR-1	08/27/93 1535	T-Metals, ABA
WR-2	WR	10	West side	None	4.4 (D)	0.03			
WR-3	WR	80	Center	None	6.2 (D)	0.04			
WR-4A	WR	3,200	Base of mill building	None	< 3.5 (D)	0.05	29-451-WR-2	08/27/93 1700	T-Metals, ABA
WR-4B	WR		Base of storage building	None	< 3.5 (D)	0.03			
WR-5A	WR	1,000	North side	None	5.2 (D)	0.04			
WR-5B	WR		Center	None	< 3.5 (D)	0.03			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-451-WR-1 is composite of WR-1, -2, and -3. 29-451-WR-2 is composite of WR-4A and -4B, and WR-5A and -5B.
*Continued on next page

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: Babits, Flammang, Pierson

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	2,500	Hole near center in southwest quadrant; 0'-2', reddish brown sand	Bermed pond	6.4 (D)	0.02	29-451-TP-1	08/27/93 2008	T-Metals, ABA, CN-
TP-1A-B	TAIL		Hole near center in southwest quadrant; 2'-5.5', light tan sand	Bermed pond	6.0 (D)	0.04			
TP-1A-C	TAIL		Hole near center in southwest quadrant; 5.5'-9.5', tan clay	Bermed pond	6.1 (D)	0.04	29-451-TP-2	08/27/93 2000	T-Metals, ABA, CN-
TP-1A-D	TAIL		Hole near center in southwest quadrant; 9.5'-11', tan silt/sand	Bermed pond	6.5 (D)	0.035			
TP-1A-E	TAIL		Hole near center in southwest quadrant; 11'-12', orange red sand	Bermed pond	6.1 (D)	0.03			
TP-1A-F	TAIL		Hole near center in southwest quadrant; 12'-13', medium dark brown sand	Bermed pond	6.8 (D)	0.04			
TP-2A-A	TAIL	2,800	Near north end of pond; 0'-2.5', tan sand	Bermed pond	6.5 (D)	0.025			
TP-2A-B	TAIL		Near north end of pond; 2.5'-5', medium brown clay	Bermed pond	5.6 (D)	0.025			
TP-2A-C	TAIL		Near north end of pond; 5'-6', medium orange sand	Bermed pond	5.25 (D)	0.035			
TP-3A-A	TAIL	1,800	Near center of pond 3; 0'-4.5', tan to brown sand	Bermed pond	5.6 (D)	0.035			
TP-3A-B	TAIL		Near center of pond 3; 4.5'-7', gray sandy clay	Bermed pond	6.1 (D)	0.03			
TP-3A-C	TAIL		Near center of pond 3; 7'-10.5', gray/tan sand/clay	Bermed pond	6.1 (D)	0.03			
TP-3A-D	TAIL		Near center of pond 3; 10.5'-12.5', medium brown silt	Bermed pond	6.0 (D)	0.035			
TP-3A-E	TAIL		Near center of pond 3; 12.5'-13', underlying soil	Bermed pond	6.5 (D)	0.035			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-451-TP-1 is composite of TP-1A-A and -1A-B, TP-2A-A and -2A-B, and TP-3A-A. 29-451-TP-2 is composite of TP-1A-C through -1A-F, TP-2A-C, and TP-3A-B through -3A-E.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No_X_, Number:____ Identification:______________

Filled shafts: Yes___, No_X_, Number:____ Identification:______________

Seeps/Springs: Yes___, No_X_, Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes_X_, No___;
Number of well logs: 183

Distance to nearest well used for drinking? Approx. 1/4 mile from TP-3; approx. 200 feet from WR-5

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible_X__, Unlikely____.
There is very little water on or flowing through the site except in WR-
floodplain. Tailings and waste rock contain elevated metal values.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Mill Creek

Dry streambeds: Yes X, No ___, Name(s): One dry drainage on east side of the site, and one on the west side.

Other surface water: Yes X, No ___, Name(s)/Description: Small amount of standing water on TP-3, probably from recent storms.

Waste materials within any floodplain: Yes X, No ___ Source ID(s): Toe of WR-5 is in Mill Creek.

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 75 during investigation
High Flow: 800 cfs, Average Flow: 80 cfs

Distance between waste source(s) and nearest surface water body (ft)? 0 feet; Toe of WR-5 is in Mill Creek.

Surface water draining onto or through waste sources: Yes X, No ___,
Describe: Toe of WR-5 is in Mill Creek.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Irrigation, wetlands, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X, Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): None observed during this investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: Babits

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SE-1	SE	500 feet upgradient of WR-5 in Mill Creek	6.55	189	228	NM	NM	75 cfs (E)	29-451-SE-1	08/27/93 1325	T-Metals
SE-2	SE	Downgradient (at PPE) of WR-5 in Mill Creek	6.55	189	147	NM	NM	75 cfs (E)	29-451-SE-2	08/27/93 1315	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): NM = Not Measured

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Approx. 2 acres below TP-3 before Mill Creek.

Wetlands present: Yes X , No___, Describe: Streamside only

Carbonate rocks/soils: Yes X , No___, Describe: Limestone is host rock.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300 X ; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? Approx. 150 feet from WR-5

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Flammang, Pierson

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	None	Dry	80 cu. yds.	20 cu. yds.	No	None/Low
WR-2	None	Dry	10 cu. yds.	3 cu. yds.	No	None/Low
WR-3	SO3	Dry	60 cu. yds.	30 cu. yds.	No	None/Low
WR-4	ESD	Dry	16,200	16,200	Yes	Low
WR-5	ESD; SO3	Dry	3,700	8,100	Yes	Low
TP-1	None	Dry	6,750	6,750	Yes	Low
TP-2	None	Dry	11,700	2,340	Yes	Low
TP-3	None	Partial	3,780	3,780	Yes	Low

Notes and Clarifications: ______

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes X , No____, Describe: Residence by WR-5

Population within 1 mile: 1-10___; 10-30 X ; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments____

Evidence of recreational use on site: Yes X , No___, Describe: Beer and pop cans, bullet holes

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment____
Wilderness Area - Yes___, No X , Comment____
T&E Species Habitat - Yes___, No X , Comment____
Bat Habitat - Yes___, No X , Comment____

Primary Drainage___; Secondary Drainage X ; No Information___:

Riparian Habitat Quality - High X , Medium___, Low___
Wetlands Frontage - High___, Medium X , Low___
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 4

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes___, No X , Number____, types and locations:____

Hazardous structures: Yes X , No___, Number 5 , types and locations: Northeast building; southeast building, ore loadout; north building, loadout; northwest building; and, southwest building.

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____, types and locations:____

Unstable waste piles, impoundments, undercut banks: Yes____, No X , Number____, types and locations:____

Fire and/or Explosion hazards: Yes X , No___, Explain: Wood building and, possibly, barrels of unknown substances

Bibliography

MBMG, Buckeye Mines, Madison County, Montana, Form 39, 1980-1983.

MBMG, Mineral and Industry File 90.0, Buckeye Group, Madison County, Montana.

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for Buckeye, Prepared by Chen-Northern, October 13, 1989.

USGS, Topographic Map, Sheridan, Montana, 7 1/2 minute Topographic Quadrangle, 1988.

LABORATORY ANALYTICAL DATA

BUCKEYE
PA NO. 29-451

MDSL AMRB/PIONEER 4/9/93

Buckeye PA# 29-451
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER - BABITS
INVESTIGATION DATE: 08/27/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-451-SE-1	4.27 U	31.1	0.82 U	4.57	21.5	12.5	8020	0.090 J	158	16.9	6.39	5.64 U	22.2	<0.309
29-451-SE-2	8.47 J	71	1.11 U	12.1	62	40.9	15300	0.174 J	192	40.2	55.5	7.68 U	131	<0.387
29-451-TP-1	90.3 J	101	5.65 J	12.8	24.6	205	25200	0.517 J	978	35.5	677	6.62 U	674	<0.280
29-451-TP-2	58.1 J	121	7.91 J	15.1	18.8	135	25700	1.1 J	1060	28	714	6.87 U	823	<0.283
29-451-WR-1	359 J	98.4	24.90 J	47.4	41.4	159	58700	0.907 J	3050	127	427	6.8 U	4130	NR
29-451-WR-2	129 J	21.4	17.20 J	6.1	3.92	1460	45100	2.64 J	336	7.06	10300	12.4	3060	NR
BACKGROUND	16	89.4	0.8 JX	9.4	25.1	21.6	14900	1.1	366	19	36	4 UJ	80	NR

U - Not Detected; J - Estimated Quantity; X - Outlier for Accuracy or Precision; NR - Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-451-TP-1	0.73	22.8	113	90.6	0.32	0.28	0.13	8.75	105
29-451-TP-2	0.8	25	124	99	0.19	0.54	0.07	16.9	107
29-451-WR-1DUF	1.75	54.7	117	62.6	0.31	0.86	0.58	26.9	90.4
29-451-WR-1	1.72	53.7	119	65.6	0.28	0.86	0.58	26.9	92.5
29-451-WR-2	6.22	194	15.3	-179	2.66	1.48	2.08	46.2	-30.9

LEGEND

SE1 - 500 feet upgradient of waste rock dump 5 in Mill Creek.
SE2 - Downgradient (@ PPE) of waste rock dump 5 in Mill Creek.
TP1 - Composite of subsamples TPA-A,1A-B,2A-A,2A-B,3A-A
TP2 - Composite of subsamples TP1A-C through 1A-F, TP2A-C, and TP3A-B through3A-E.
WR1 - Composite of subsamples WR1, 2, and 3.
WR1DUP - Duplicate of sample 29-451-WR-1.
WR2 - Composite of subsamples WR4A, 4B, 5A, and 5B.
BACKGROUND - From Latest Out (29-354-SS-1).

XRF ANALYSIS RESULTS

BUCKEYE
PA NO. 29-451

MDSL AMRB/PIONEER 4/9/93

Mine Name: Buckeye PA# 29-451
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-451-TP1A-A		22658.2	48132.6	3651.42		2392.54	44935.9		274.874	381.106	77.8899 *	54.5042
29-451-TP1A-B		25155.6	30019.9	3579.16		1549.22	43472.5		62.1426 *	1050.26	76.8271 *	71.297
29-451-TP1A-C		19708.9	38741.8	2708.32		1264.65 *	37484		275.896	2773.49		262.464
29-451-TP1A-D		12734.8	99040	2680.93		554.31 *	35014.9			446.423		586.253
29-451-TP1A-E		7306.4	66070.4	2053.53		683.304 *	37284.3			309.694	43.0901 *	588.647
29-451-TP1A-F		14148.3	88076.7	5080.47		1136.67 *	53328.1			283.655		1026.52
29-451-TP2A-A		16093.6	55898.8	2018.48		489.296 *	22294.7			60.5602 *		289.669
29-451-TP2A-B		15563.9	61554.2	2031.12		396.59 *	22071.1			111.362 *		329.848
29-451-TP2A-C		12776.8	116548	1615.19		2849.63	48267.1		226.686 *	1410.62		289.444
29-451-TP3A-A		19915	5846.31	1357.97		419.541 *	35694		648.248	453.908		63.0462
29-451-TP3A-B	504.056 *	46895	8255.47	5827.64	192.012 *	577.255 *	42395.9			549.251		84.7902
29-451-TP3A-C		26747.1	28895.2	3365.31		2246.88	35234.6			1180.14	87.4673 *	48.5812
29-451-TP3A-D		17806	52827.4	2363.27		679.793 *	26894.9			185.487		310.559
29-451-TP3A-E		14863.1	73948.4	2603.97		713.677 *	33594.9			432.813		564.294
29-451-TP-1-COMP		17027.1	33287	2266.61		1335.14	32658.3		106.432 *	629.575		146.685
29-451-TP-2-COMP		13288.2	59085.2	2488.81		874.044 *	34733.8		73.6431 *	718.4		400.926
29-451-WR4-A		17076.5	17800.6	1518.57			39243.5		572.057	1178.82		340.66
29-451-WR4-B		16661.3	53564.6	1755.13			52972.3		810.812	2593.68		311.794
29-451-WR5-A		28594.2	35874.1	3514.13		1355.87 *	45171.1		368.574	7395.49	230.077 *	232.42
29-451-WR5-B	364.741 *	24918.3	12928.2	744.963			58968.8		1829.84	857.715		114.155
29-451-WR-1		28134.2	26966	4675.52		3223.11	62953.2		71.2886 *	6574.1	278.483 *	43.4958
29-451-WR-1-COMP		23229	42710.1	2847.79		5746.27	65906.9			2950.68	232.529 *	94.2668
29-451-WR-2		11673.3	73165	2606.14		1966.8	49066.1			1449.67	95.4024 *	222.482
29-451-WR-2-COMP		17018.9	26861.4	1083.34			47367.5		969.436	2482.64		219.652
29-451-WR-3		23115.7	32509.3	1288.97		17124.4	96987.8			876.467	283.311	90.1372

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-451-TP1A-A	188.325			243.822	118.326	146.19 *		249.42			
29-451-TP1A-B	175.271			431.532	116.533			304.674			
29-451-TP1A-C	186.095		7.3193 *	2310.84	92.0423			356.956	88.4402 *		22.2634 *
29-451-TP1A-D	197.417			870.079	66.4682			448.448	84.4195 *		14.8072 *
29-451-TP1A-E	142.567			81.393	48.5513			396.291			11.6994 *
29-451-TP1A-F	91.413			106.014	56.9228			641.592			8.02375 *
29-451-TP2A-A	349.81				66.0712			493.829			15.6282 *
29-451-TP2A-B	316.173		6.0876 *	18.7892 *	80.1595			472.194			12.9821 *
29-451-TP2A-C	147.772		15.1586 *	1760.98	104.661			458.611	90.5006 *		14.7832 *
29-451-TP3A-A	136.285		18.9453 *	2789.31	129.374			151.712			25.0017 *
29-451-TP3A-B	110.969			269.251	191.608			325.23	92.517 *		8.2832 *
29-451-TP3A-C	154.382		5.65163 *	388.197	106.222	139.94 *		224.091			10.61 *
29-451-TP3A-D	340.419			106.325	92.2095			438.63			16.2523 *
29-451-TP3A-E	169.519			280.202	60.7106			463.689			8.64222 *
29-451-TP-1-COMP	214.939			557.06	86.7407			299.502			10.9035 *
29-451-TP-2-COMP	210.84			608.056	77.7422			358.05			9.53312 *
29-451-WR4-A	62.0308			4084.78	64.5284		199.445	86.9912	83.1495 *		
29-451-WR4-B	145.361		5.28783 *	2098.68	94.2641			198.037			
29-451-WR5-A	90.2327			1186.14	130.257			278.092	96.2625 *		
29-451-WR5-B	79.4719			8370.4	95.4244			98.6169	106.627 *		32.3683 *
29-451-WR-1	157.698			737.099	139.264			225.773	110.246 *		
29-451-WR-1-COMP	207.225			363.135	131.494			257.089			
29-451-WR-2	189.77			310.039	95.0141			291.674			
29-451-WR-2-COMP	71.879			3995.05	86.3449		56.6008 *	164.161			
29-451-WR-3	109.9		7.98645 *	202.104	143.188			165.228			7.08595 *

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BUCKEYE
PA NO. 29-451

AIMSS SCORESHEET

SITE NAME: BUCKEYE
PA NUMBER: 29-451

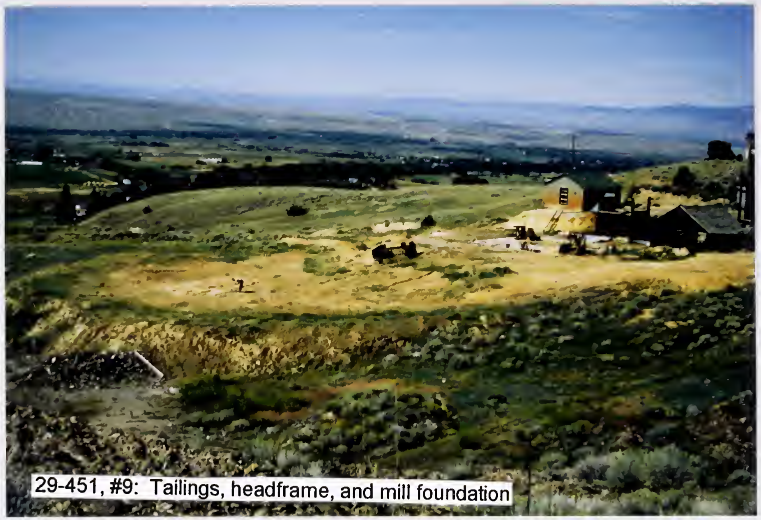
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		20
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	400
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	400
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	35.747
6	GW - TARGETS	WELLS - 1 MI. x 2.5		80.0
7		WELLS - 1 TO 4 MI		151
8		NEAREST WELL		5
9		TARGETS SCORE	LINES 6 + 7 + 8	236.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	3374517
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		300
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		20
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	400
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	700
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	39.464
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	13
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	359122
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		20
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	200
27		LIKELIHOOD SCORE	LINES 25 + 26C	200
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.230
29	AIR - TARGETS	POPULATION - 4 MILES		100
30		NEAREST RESIDENCE		10
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	120
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	29520
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		250
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		20
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	400
38		LIKELIHOOD SCORE	LINES 36 + 37C	650
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	1.115
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		10
41		NEAREST RESIDENCE		10
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	25
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	18119
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**37.81**

SITE NAME: BUCKEYE
PA NUMBER: 29-451

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	0
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	200
6		EXPLOSIVES		50
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	350
9		POPULATION - 1 MILE		10
10	TARGETS	NEAREST RESIDENCE		10
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	25
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**175.00**

29-451, #8: Adit at revegetated dump


29-451, #9: Tailings, headframe, and mill foundation

29-451, #10: WR-3

29-451, #11: WR-5 and Miller Creek in trees

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: PEDRO PA#: 29-455

Date: June 18, 1993 Time: 1100-1600

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; cool; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #13: TP-1; #14: TP-2; #15: HMO Shaft; #16: WR-1; #17: WR-2; #18: WR-3; #19: WR-4; #20: WR-4; #21: HMO Adit. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms): Not much at site; barren dumps, no water, 2 HMOs. Unknown if there was a mill, but it seems unlikely.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Recontour and revegetate dumps; close open adits.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): PEDRO PA#: 29-455

Legal Description: T 4S ;R 3W ;Sec. 17 ,SW 1/4SW 1/4___1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 29' 48" Longitude: W 112° 00' 10"

Primary Drainage Basin and Code: Ramshorn Creek/10020003
Secondary Drainage Basin: North Fork Ramshorn Creek

USGS Quadrangle map name(s): Copper Mountain

Mine Type/Commodities: Hardrock/Lead, Silver, Gold

Activity Status: Active___,Inactive/Exploration___,Abandoned X .

Ownership status: Known YX N__; private/public? Public
Owner, Agent, or Contact(Include address and phone when available): Beaverhead National Forest.

Relationship to other mines/sites in the area/district: Unknown

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? N/A

General site features: Elevation 8420', Slope 15°-30°,
Aspect Waste rock, southwest; adits, north

Land use: Mining___, Recreational X , Residential___, Urban___,
Agricultural___, Other(Specify)

Area of disturbed/unvegetated lands? 4 acres.
Dimensions:

Predominant vegetation types: Lodgepole pine/fir forest

Access: roads - good___,poor X ,4wd___,trail___.
Other logistical considerations (proximity to other sites).

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There is 1 well log within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies at the headwaters of North Fork Ramshorn Creek on the north side of the creek. Water leaving the site would flow southeast to the creek and then east in the creek.

Mining/milling history, ore type/tenor, host rock, gangue: History on the Pedro is unavailable. Mines in the immediate area were veins in a schist cut by granites (occasionally). The ores carry lead and silver with gold. Vein materials include galena, pyrite, chalcopyrite, bornite, quartz, hematite, limonite, siderite, talc, muscovite, and a little epidote.

Mine Operation?
Shafts - Yes X, No ___, # 1, Comment HMO; 30x30x30' deep pit
Adits - Yes X, No ___, # 7+, Comment 1 HMO; rest caved
Pits - Yes ___, No X, # ___, Comment ___
Placers - Yes ___, No X, # ___, Comment ___
Other - Yes ___, No X, # ___, Comment ___

Mill Operation? Yes ___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

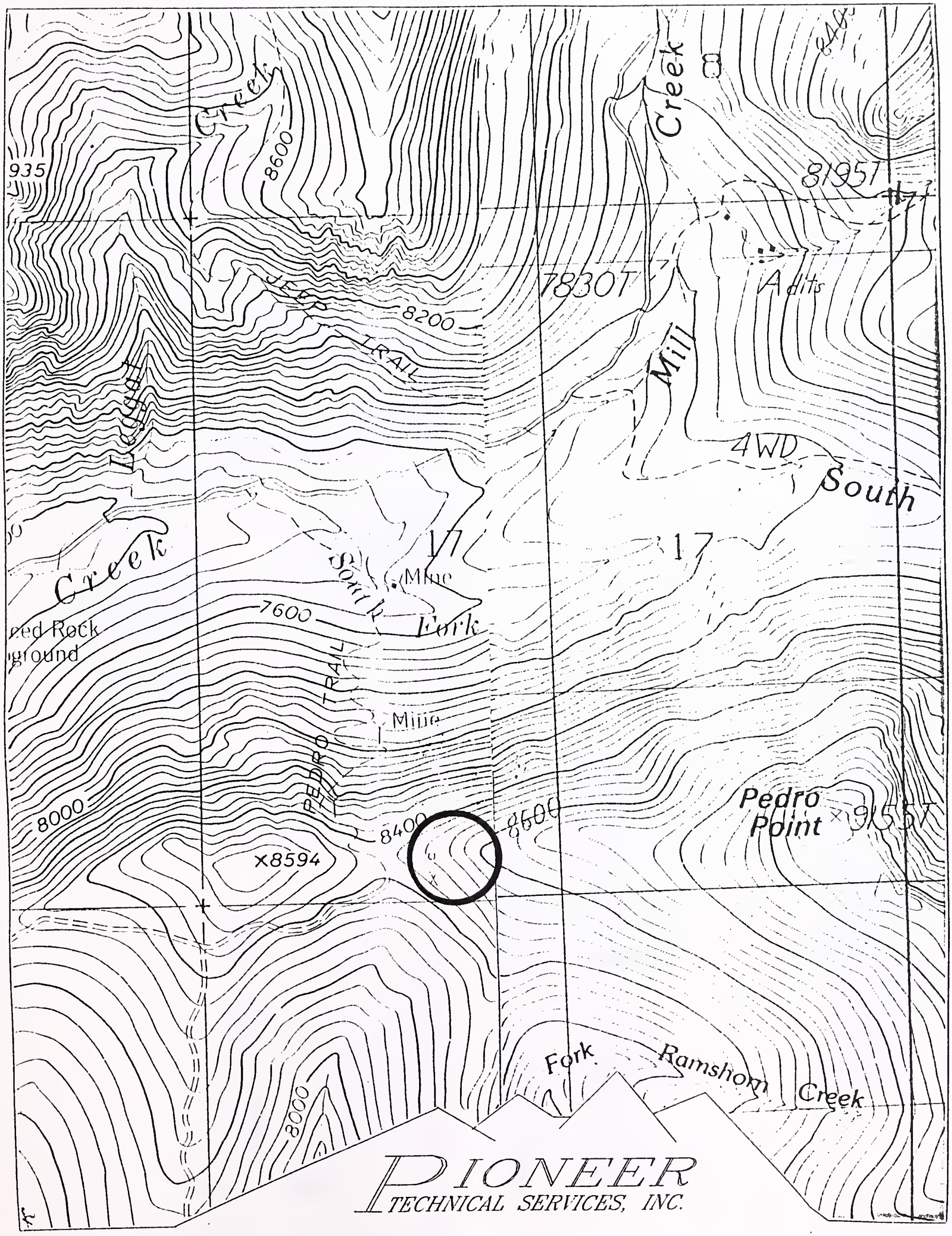
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
N/A

Montana Bureau of Mines and Geology
Water Well Log Data

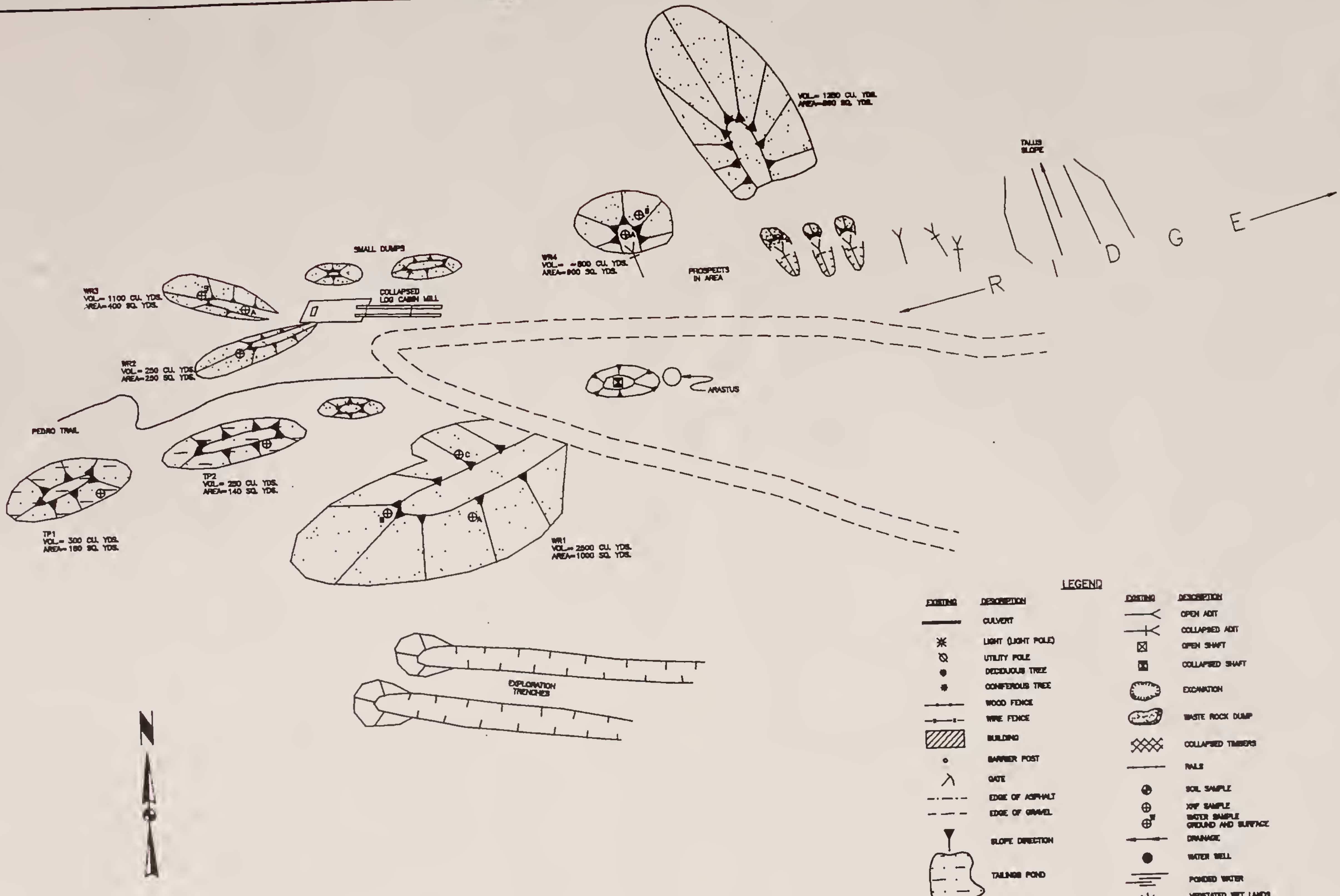
10/22/1993

Well No.	Location	Depth	Yield	Static Water Level
M:107786	04S 03W 16 AA	61.0	6.0	10.00



PIONEER
TECHNICAL SERVICES, INC.

PEDRO, P.A. NO. 29-455
T04S, R03W, SECTION 17
SCALE: 1" = 1000'



NOT TO SCALE

DRAWN JTP DATE 29 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED MJB F.B. NO. ____

PIONEER

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

PEDRO PA# 29-455
SHERIDAN DISTRICT MADISON COUNTY

29-455.DWG SHEETS

SHEET NO.

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): "Tailings piles" may be just waste rock (sand/silt/rocks); no evidence of a mill at the site.

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): No impoundment

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1A	WR	2,500	Associated with the collapsed shaft, largest dump; south side	None	6.1 (D)	0.045	29-455-WR-1	06/18/93 1430	T-Metals, ABA
WR-1B	WR		Associated with the collapsed shaft, largest dump; west end	None	6.2 (D)	0.05			
WR-1C	WR		Associated with the collapsed shaft, largest dump; north side	None	6.8 (D)	0.06			
WR-2	WR	250	Near collapsed log cabin and Pedro Trail; west end	None	6.8 (D)	0.06	29-455-WR-2	06/18/93 1520	T-Metals, ABA
WR-3A	WR	1,100	Near collapsed log cabin alongside WR-2; east end on top	None	6.8 (D)	0.05			
WR-3B	WR		Near collapsed log cabin alongside WR-2; west end	None	6.8 (D)	0.05			
WR-4A	WR	2,050	Approx. 200 feet from WR-3 to the east; on top just north of adit	None	6.6 (D)	0.03	29-455-WR-3	06/18/93 1445	T-Metals, ABA
WR-4B	WR		Approx. 200 feet from WR-3 to the east; northeast corner	None	6.5 (D)	0.035			
TP-1	WR?	300	Located below WR-1, unlikely to be tailings; southeast corner near bottom	None	6.6 (D)	0.045	N/A	N/A	XRF Analysis
TP-2	WR?	250	East of TP-1; southeast corner	None	6.4 (D)	0.4	N/A	N/A	XRF Analysis

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-455-WR-1 is composite of WR-1A through -1C. 29-455-WR-2 is composite of WR-2 and WR-3A and -3B. 29-455-WR-3 is composite of WR-4A and -4B.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____

Filled shafts: Yes___, No X , Number:____ Identification:____

Seeps/Springs: Yes___, No X , Number:____ Identification:____

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 2

Distance to nearest well used for drinking? 3/4 mile to a campground which may have a well.

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible____, Unlikely X .
High pH, low metals content of dumps.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X_, Name(s):____

Dry streambeds: Yes_X__, No____, Name(s):_Headwaters of North Fork Ramshorn Creek

Other surface water: Yes____, No_X_, Name(s)/Description:____

Waste materials within any floodplain: Yes____, No_X_ Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)?_N/A

High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?_ 1/4 mile to dry fork of North Fork Ramshorn Creek; 1/2 mile to flowing creek.

Surface water draining onto or through waste sources: Yes____, No_X__, Describe:____

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?) No surface water on the site; North Fork Ramshorn Creek has fishery and wetland.

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X__, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present): N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 1 to 2 acres

Wetlands present: Yes___, No X , Describe:

Carbonate rocks/soils: Yes X , No____, Describe: Small layers of limestone are reported in the host rock description; higher readings on waste rock pH's, but no carbonate rocks were found.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 X ; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 5 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH/MODERATE/LOW/NONE)
WR-1	Minor SO3; FEOX	Dry	9,000	9,000	No	Low
WR-2	Minor SO3; FEOX	Dry	2,250	2,250	No	Low
WR-3	Minor SO3; FEOX	Dry	3,600	1,800	No	Low
WR-4	Minor SO3; FEOX	Dry	16,020	0	No	Low
TP-1	Minor SO3; FEOX	Dry	1,620	0	Some sand	Low
TP-2	Minor SO3; FEOX	Dry	1,260	0	Some sand	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X,
Describe:________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes___, No X, Describe:________

Accessibility - Fences, warning signs, closed roads? Forest Service restricted access road, but no gate.

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X, Comment________
Wilderness Area - Yes___, No X, Comment________
T&E Species Habitat - Yes___, No X, Comment________
Bat Habitat - Yes___, No X, Comment________

Primary Drainage X; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High X, Medium___, Low___
Wetlands Frontage - High___, Medium X, Low___
Fisheries Habitat and Species Classification - Not Rated
Sport Fishery Classification - Not Rated

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X, No___, Number 2, types and locations:
One adit, north side of ridge; one shaft (pit), just east of road.

Hazardous structures: Yes___, No X, Number____, types and locations:____

Unstable highwalls, pits, trenches, slopes: Yes X, No___, Number 1,
types and locations: Shaft has caved into unstable pit.

Unstable waste piles, impoundments, undercut banks: Yes X, No____,
Number 3, types and locations: Dumps WR-1, -3, and -4 are at angle of repose.

Fire and/or Explosion hazards: Yes___, No X, Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the Pedro mine, Prepared by Chen-Northern, October 17, 1989.

USBM, Gold Lode Mining in the Tobacco Root Mountains, Madison County, Montana, Information Circular 6972, Written by S.H. Lorain, November 1937, pp. 61-71.

USGS, Mining Districts of the Dillon Quadrangle, Montana and Adjacent Areas, Bulletin No. 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Copper Mountain, Montana, 7 1/2 minute Quadrangle, 1963.

LABORATORY ANALYTICAL DATA

PEDRO
PA NO. 29-455

Pedro PA# 29-455
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 06/18/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29-455-WR-1	5	150	0.4 U	11.8	31.3	34.5	23700	0.913	717	26	12	3 UJ	65	NR
29-455-WR-2	12	111	0.5 U	11.3	39.7	33.5	22500	0.145	561	31	72	4 UJ	82	NR
29-455-WR-3	26	160	0.5 U	28.6	257	53.9	30500	0.418	1090	296	78	4 UJ	112	NR
BACKGROUND	20	96.4	1.2 JX	20.2	42.1	35.1	18200	0.017 U	608	59	25	4 UJ	61	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29-455-WR-1	0.01	0.31	18.2	17.8	<0.01	<0.01	0.01	0	18.2
29-455-WR-2	<0.01	0	6.41	6.41	<0.01	<0.01	<0.01	0	6.41
29-455-WR-3	0.03	0.94	10.5	9.59	0.01	<0.01	0.02	0	10.5

LEGEND

WR1 – Composite of subsamples WR1A through 1C.
WR2 – Composite of subsamples WR2, 3A, and 3B.
WR3 – Composite of subsamples WR4A and 4B.
BACKGROUND – From Uncle Sam Mine (29-383-SS-1).

XRF ANALYSIS RESULTS

PEDRO
PA NO. 29-455

Mine Name: Pedro PA# 29-455
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-455-TP-1	1133.7 *	5452.11	7904.17	1970.73	719.893	2554.17	54067	491.907 *		153.735		102.581
29-455-TP-2		12061.5	8472.67	918.201		520.494 *	15114.1	215.445 *		102.069 *	41.5254 *	284.694
29-455-WR1-A		15195	8815.08	3793.61		1454.65	44136.9			117.31 *		138.558
29-455-WR1-B		12596.3	10870.8	2780.96		794.714 *	35972.3			156.982	39.7639 *	147.59
29-455-WR1-C		9205.66	18691.8	1208.75		484.508 *	20378.3			78.99 *		266.209
29-455-WR3-A		20568.4	5089.93	2394.08		997.895 *	37200.6			146.523		166.242
29-455-WR3-B		17364.5	4626.46	977.25		643.89 *	19958.1			172.195		89.6504
29-455-WR4-A	497.678 *	12613.4	5261.69	1254.94	356.206	1445.92	41106.4			162.801		88.7542
29-455-WR4-B	388.025 *	9369.69	9149.08	1741.01	357.056 *	2085.37	49265.7			164.264		137.581
29-455-WR-1-COMP		11541.8	12031.7	2557.55		844.328 *	31822			99.5886 *		176.764
29-455-WR-2		19750	3896.29	1193.44		1029.99 *	35062.4			157.12	38.6645 *	56.1842
29-455-WR-2-COMP		24526	4305.47	1673.6		953.123 *	33271.4			143.508 *		112.384
29-455-WR-3-COMP	655.127 *	9750.43	7227.63	1599.12	379.268	1587.81	46135.7			191.686		109.399

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-455-TP-1	47.5415				38.3691 *			249.311	205.111 *	11.6791 *	
29-455-TP-2	60.7821		3.19211 *	19.0023 *	37.7532			274.973			
29-455-WR1-A	110.253		7.57513 *		70.3182			425.883			
29-455-WR1-B	102.125				43.6971 *			418.251		17.464 *	
29-455-WR1-C	52.0723	32.7226 *			19.4504 *			312.144		12.088 *	
29-455-WR3-A	55.866		6.1761 *	25.1202 *	74.3418			400.365		11.982 *	
29-455-WR3-B	96.8104			40.2528 *	66.3845			361.881			
29-455-WR4-A	55.0036			32.7974 *	34.962 *			301.375		9.73165 *	
29-455-WR4-B	71.2672			64.0097 *	39.8874 *			302.287	251 *	9.67173 *	
29-455-WR-1-COMP	91.6863				39.8448 *			327.647		14.6883 *	
29-455-WR-2	75.1147			63.5163 *	58.9445			461.987	227.084 *	13.8499 *	
29-455-WR-2-COMP	74.0984				88.4648		33.3331 *	520.338			
29-455-WR-3-COMP	47.2473			62.2042 *	44.89			325.498			

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

PEDRO
PA NO. 29-455

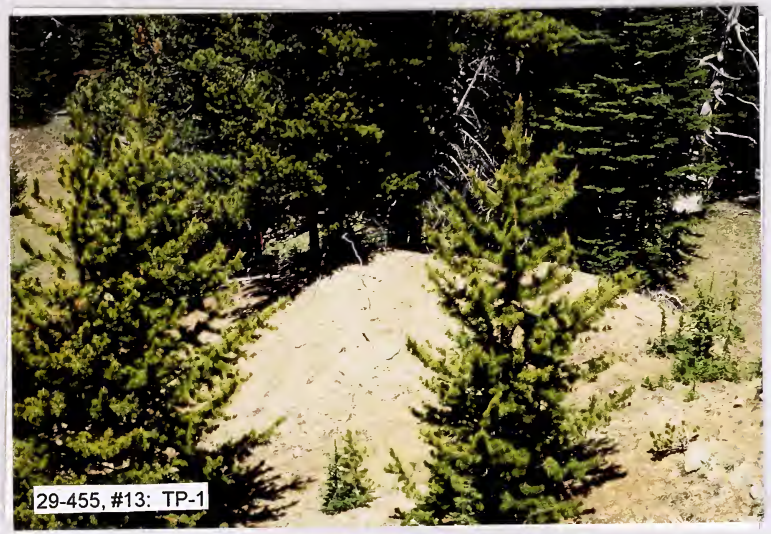
AIMSS SCORESHEET

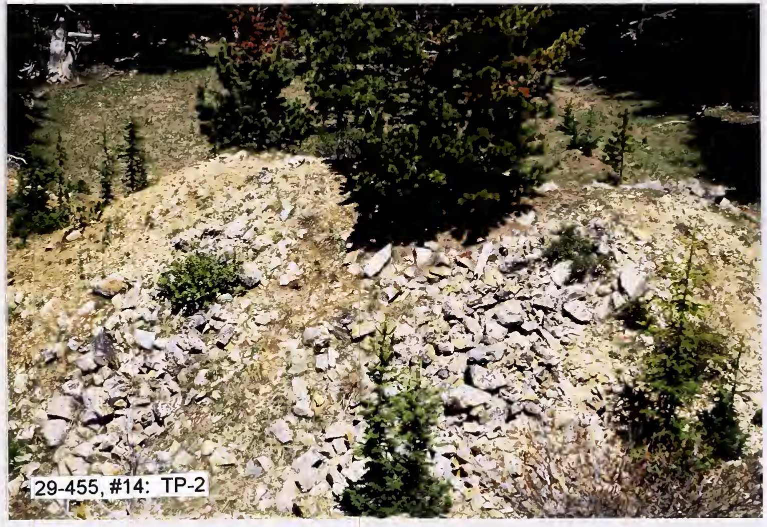
SITE NAME: PEDRO MINE
PA NUMBER: 29-455

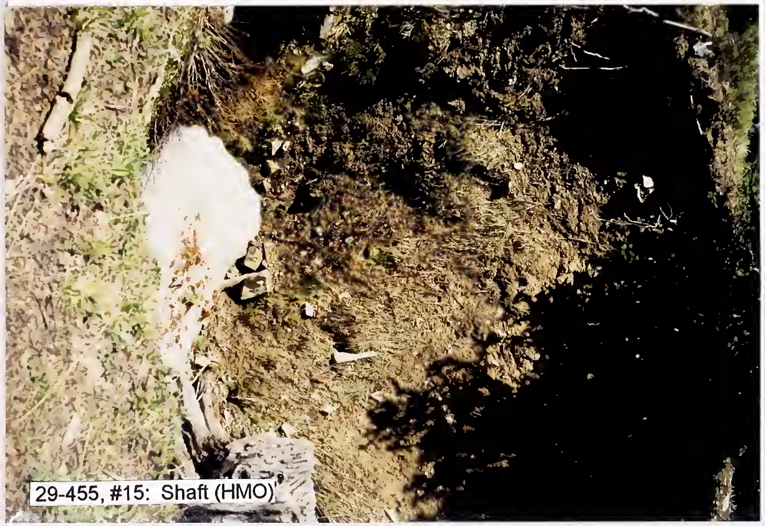
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.560
6	GW - TARGETS	WELLS - 1 MI. x 2.5		2.5
7		WELLS - 1 TO 4 MI		1
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	3.5
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	78
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.596
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		0
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		0
23		TARGETS SCORE	SUM LINES 16 THRU 22	10
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	238
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.001
29	AIR - TARGETS	POPULATION - 4 MILES		1
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		0
34		TARGETS SCORE	SUM LINES 29 THRU 33	11
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	1
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	50
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**0.00**

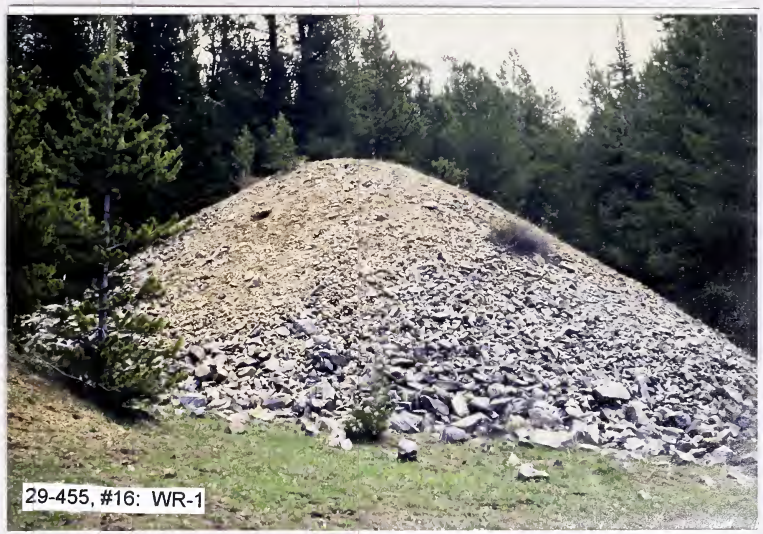
SITE NAME: PEDRO MINE
PA NUMBER: 29-455

LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		10
2		OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	50
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	150
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**


29-455, #13: TP-1


29-455, #14: TP-2


29-455, #15: Shaft (HMO)

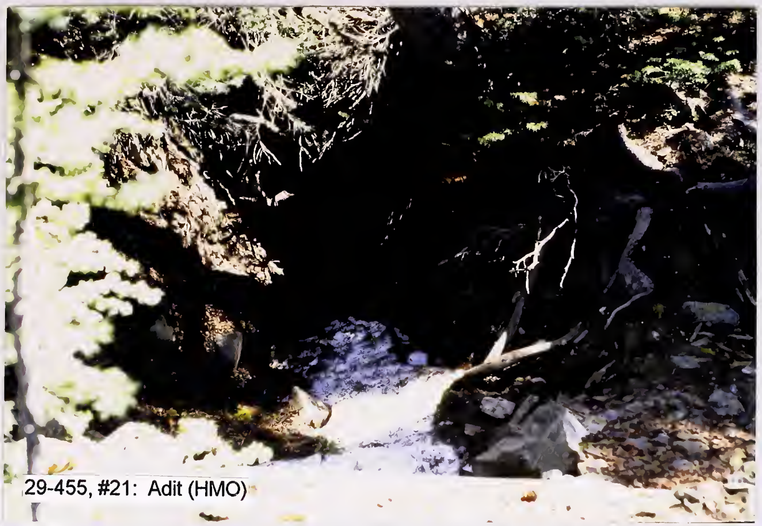

29-455, #16: WR-1

29-455, #17: WR-2

29-455, #18: WR-3

29-455, #19: WR-4

29-455, #20: WR-4



29-455, #21: Adit (HMO)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: SE SW S26 Keyaste **PA#:** 29-474

Date: June 17, 1993 **Time:** 0830

Field Team Leader: Tuesday, Pioneer

Sampling Personnel: Belanger, Pioneer
Clark, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; no rain; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number)**:** #25: WR-1; #26: WR-2; #27: WR-3; #28: Adit #3 (HMO); #29: WR-4; #30: Adit #4B (HMO); #31: WR-4B; #32: Adit #5 (HMO); #33: WR-5; #34: WR-6A; #35: WR-6B & 6C; #36: WR-6D; #37: WR-6E. Roll #2: #1: WR-7 LT side & WR-9 RT side; #2: WR-8 (Chen-Northern #1); #3: WR-10; #4: WR-11; #5: WR-12; #6: WR-13; #7: WR-17; #8: WR-16; #9: WR-14; #10: WR-15 Center & WR-14 lower right adit. Video Tape No. 2

General Comments/Observations (not covered specifically in attached Inventory Forms)**:** Adits 6A through 6E are waste rock dumps from different adits. Background soil samples not taken at this site, but one taken at 29-476. Dumps 1,2,3,4,4B,5,6A-E from upper road traverse-east facing slope - similar rock, FEOX, and chem (XRF). Dumps 7,8,9 on lower switch, SE facing slope. Dumps 10,11,12,13 on east facing slope; similar except #12. No. 12 was mostly unmineralized, unstained material. Dumps 14,15,16,17 - same knob, facing SW,SW,S,and SE.

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Grade and revegetate dumps.

MDSL AMRB/PIONEER 4/9/93

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): SE SW S26 PA#: 29-474

Legal Description: T 3S ;R 5W ;Sec. 26 ,SE 1/4SW 1/4 ___ 1/4
Sec. 35 ,NW 1/4NW 1/4 ___ 1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 32' 30" Longitude: W 112° 11' 20"

Primary Drainage Basin and Code: Ruby River/10020003
Secondary Drainage Basin: Wet Georgia Gulch

USGS Quadrangle map name(s): Old Baldy Mountain

Mine Type/Commodities: Hardrock/Unknown
Activity Status: Active ___,Inactive/Exploration ___,Abandoned X .

Ownership status: Known YX N ___; private/public? Private/Public
Owner, Agent, or Contact(Include address and phone when available): Warren and Carol Swager, Jr., P.O. Box 555, Sheridan, MT 59749. (406) 842-5554; Mary Victoria Leiter Butler Trust, c/o Bond, 5301 Wisconsin Avenue, Suite 300, Washington, D.C. 20015; Beaverhead National Forest.

Relationship to other mines/sites in the area/district: Below NW SE S26 (29-476).

Regulatory Status (Activity by other agencies)? Hardrock permits?
Past Reclamation Activities? N/A

General site features: Elevation 8000' , Slope 30°-35° ,
Aspect Southeast

Land use: Mining X , Recreational X , Residential ___, Urban ___,
Agricultural X , Other(Specify) ___

Area of disturbed/unvegetated lands? 10 acres.
Dimensions: There are over 22 waste rock dumps spread over approximately 10 acres.

Predominant vegetation types: Sagebrush, pine, grasses

Access: roads - good X ,poor ___,4wd ___,trail ___.
Other logistical considerations (proximity to other sites). ___

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 2 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site lies in the headwaters area of the Wet Georgia Gulch, which is dry (intermittent) in the mine area. Water leaving the site would flow south until it reached Wet Georgia Gulch which flows south for 1/2 mile then turns west. Wet Georgia Gulch reaches the Ruby River approx. 7 miles below the mine site.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

Mine Operation?

Shafts - Yes___, No X, # ___, Comment

Adits - Yes X, No___, # 22+, Comment 3 open

Pits - Yes___, No X, # ___, Comment

Placers - Yes___, No X, # ___, Comment

Other - Yes___, No X, # ___, Comment

Mill Operation? Yes___, No X. If yes answer the next three questions:

Period(s) of Operation: N/A

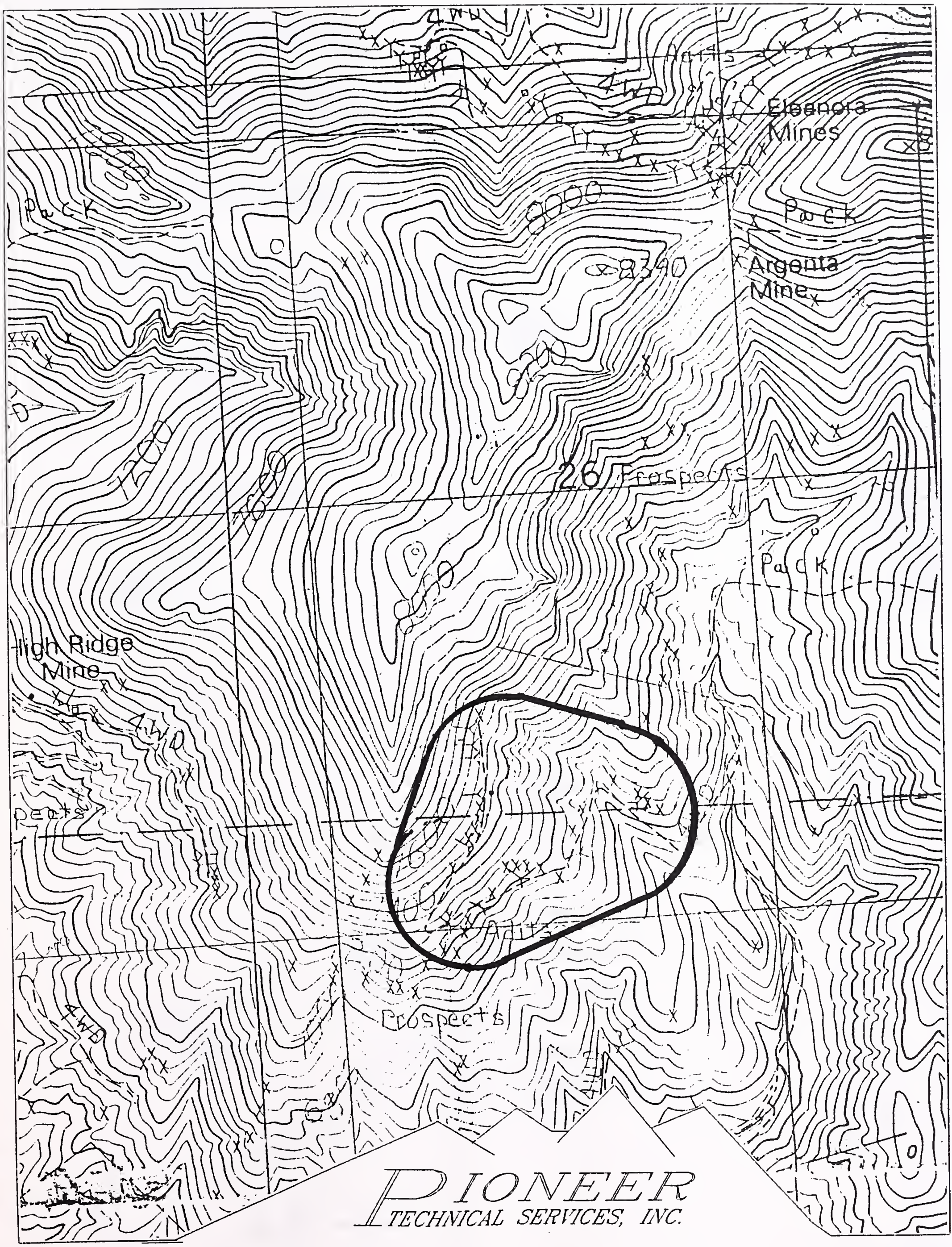
Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting? N/A

Montana Bureau of Mines and Geology
Water Well Log Data

10/22/1993

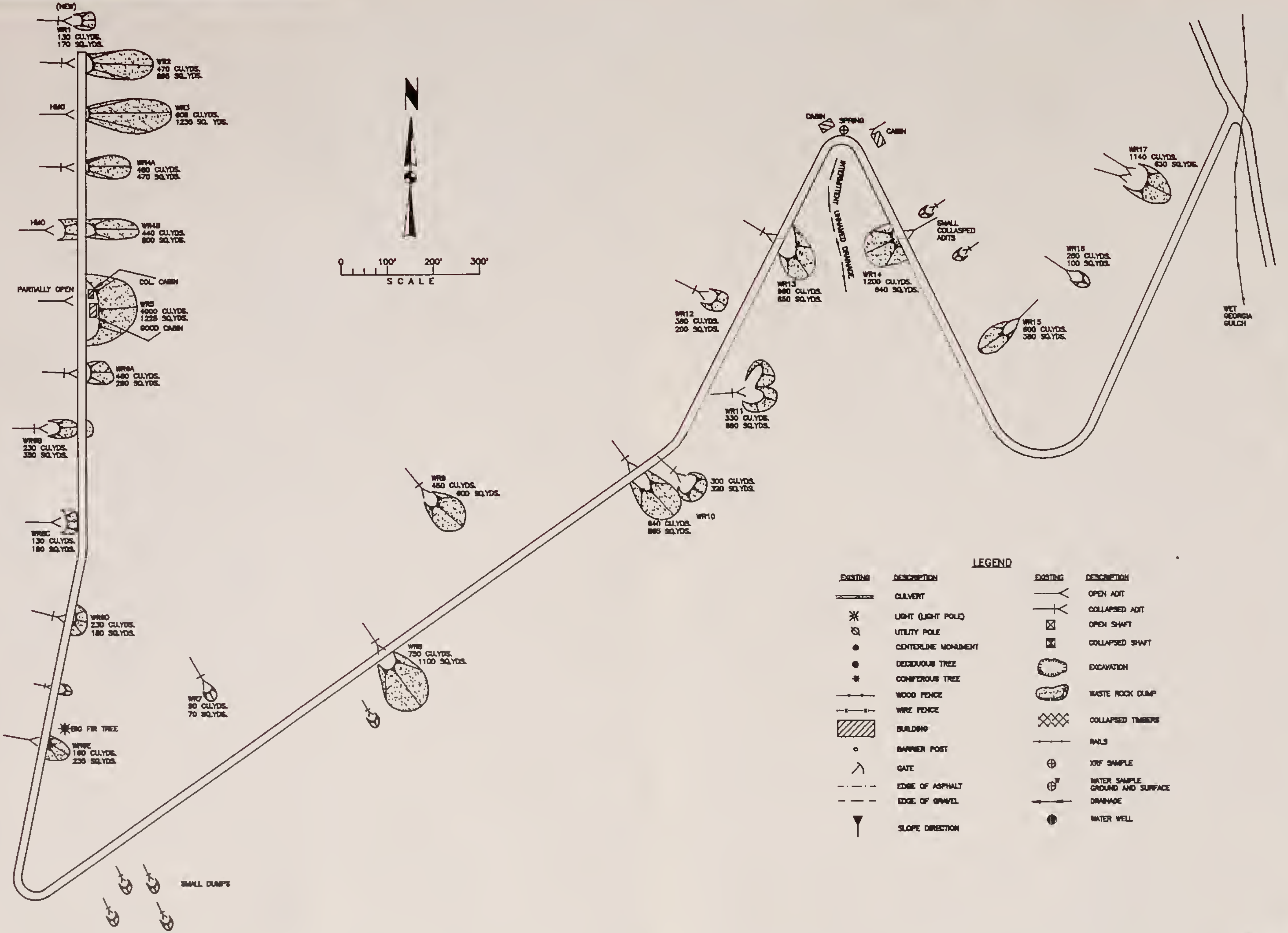
Well No.	Location	Depth	Yield	Static Water Level
M:107820	04S 05W 02 BA	38.0	80.0	5.00
M:107821	04S 05W 02 D	140.0	8.0	28.00



PIONEER
TECHNICAL SERVICES, INC.

SE SW S26, P.A. NO. 29-474

T03S, R05W, SECTIONS 26, 35
SCALE: 1" = 1000'



DRAWN JTP DATE 5 AUG 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

TD&H

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

NW NW SEC.35 / SE SW SEC.26 PA# 29-474
SHERIDAN DISTRICT MADISON COUNTY

SHEET NO.

29-474.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Tuesday, Belanger*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	130	Top dump furthest north	None	6.0 (D)	0.05	29-474-WR-1	06/17/93 2230	T-Metals, ABA
WR-2	WR	470	North dump south of WR-1	None	6.6 (D)	0.035			
WR-3	WR	609	Dump south of WR-2	None	6.4 (D)	0.04			
WR-4A	WR	450	Dump south of WR-3	None	6.4 (D)	0.05			
WR-4B	WR	440	Dump south of WR-4A	None	6.8 (D)	0.05			
WR-5	WR	4,000	Large dump with wood structure south of WR-4B	None	6.6 (D)	0.045			
WR-6A	WR	460	Dump south of WR-5 below road	None	5.9 (D)	0.045			
WR-6B	WR	230	South of WR-6A mostly above road	None	6.4 (D)	0.07			
WR-6C	WR	130	South of WR-6B mostly above road	None	6.8 (D)	0.055			
WR-6D	WR	230	South of WR-6C below road	None	6.4 (D)	0.05			
WR-6E	WR	460	South of WR-6D below road	None	6.1 (D)	0.055			
WR-7	WR	90	Southern most dump below WR-6E above road after curves	None	6.4 (D)	0.04	29-474-WR-2	06/17/93 2300	T-Metals, ABA
WR-8	WR	750	East of WR-7 below road	None	6.1 (D)	0.03			
WR-9	WR	450	North of WR-7 above road	None	6.0 (D)	0.055			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-474-WR-1 is composite of WR-1 through WR-6E. 29-474-WR-2 is composite of WR-7 through WR-9.

*Continued on next page

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-10	WR	1,140	East of WR-9 below road	None	6.2 (D)	0.045	29-474-WR-4	06/17/93 2330	T-Metals, ABA
WR-11	WR	330	Dump with loadout north of WR-10 below road	None	6.2 (D)	0.035			
WR-12	WR	250	North of WR-11 above road	None	5.9 (D)	0.065	N/A	N/A	XRF Analysis
WR-13	WR	600	North of WR-12 below road southeast of cabin	None	6.6 (D)	0.05			
WR-14	WR	1,200	Dump below road after road curves back to southeast	None	5.6 (D)	0.05	29-474-WR-4	06/17/93 2330	T-Metals, ABA
WR-15	WR	600	West of WR-14 above road	None	6.2 (D)	0.05			
WR-16	WR	250	South of WR-17, second dump after turn off Wet Georgia Gulch Road	None	6.2 (D)	0.065			
WR-17	WR	1,140	North of WR-16, first dump after turn off Wet Georgia Gulch Road	None	6.0 (D)	0.05			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-474-WR-3 is composite of WR-10, -11, and -13. 29-474-WR-4 is composite of WR-14 through WR-17.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes X , No___, Number: 1 Identification: Tributary of Wet Georgia Gulch; near cabin.

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 146

Distance to nearest well used for drinking? 1 mile southwest

Sample types: Flowing adits (AD); filled shafts (SH);
Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
There are 22 or more waste rock dumps on the hillside; the possibility of groundwater contamination exists due to the numerous quantity and steep slopes. Dumps contain elevated metal values; however, there is no water present on the site.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No_X_, Name(s):____________

Dry streambeds: Yes_X__, No___, Name(s): Tributary to Wet Georgia Gulch

Other surface water: Yes____, No_X_, Name(s)/Description:____________

Waste materials within any floodplain: Yes____, No_X_ Source ID(s):_

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)?
30 feet from WR-14 to dry tributary.

Surface water draining onto or through waste sources: Yes____, No_X__,
Describe:____________

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Wetlands in Wet Georgia Gulch

Observed erosional/sedimentation/stream turbidity problems? Yes_____, No_X___, Distance downstream (ft)?________ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):________
N/A

SURFACE WATER INVENTORY FORM

SAMPLERS: ______________________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow$^+$ cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ______________________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides? (SO_3)

Presence of evaporative salt deposits? (ESD)

Discolored or turbid seepage? (SPG)

Presence of long filamentous algae in drainages, mosses in moist areas?

Presence of ferric hydroxide precipitates? (FEOX)

Presence of burned or stressed vegetation? (VEG)

pH ≤ 5.0 (pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? Very steep (30°); minimal stream valley.

Wetlands present: Yes___, No_X_, Describe:___

Carbonate rocks/soils: Yes_X_, No___, Describe: Possible because of some of the higher pH readings, but was not observed.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100_X_; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments___

Nearest residence(ft or miles)? 1 mile southwest

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Tuesday, Belanger

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	FEOX	Dry	1,530	1,530	Yes	Low
WR-2	FEOX	Dry	7,965	7,965	Yes	Low
WR-3	FEOX	Dry	11,115	11,115	Yes	Low
WR-4	FEOX	Dry	8,730	8,730	Yes	Low
WR-5	FEOX	Dry	11,025	11,025	Yes	Low
WR-6	Little FEOX on -6E	Dry	10,980	10,980	Yes	Low
WR-7	None	Dry	630	630	Yes	Low
WR-8	None	Dry	9,900	9,900	Yes	Low
WR-9	FEOX	Dry	5,400	5,400	Yes	Low
WR-10	None	Dry	10,665	10,665	Yes	Low
WR-11	None	Dry	6,120	6,120	Yes	Low
WR-12	None	Dry	1,800	1,800	Yes	Low
WR-13	None	Dry	5,850	9,900	Yes	Low
WR-14	None	Dry	5,760	5,760	Yes	Low
WR-15	FEOX	Dry	3,420	3,420	Yes	Low
WR-16	FEOX	Dry	900	900	Yes	Low
WR-17	FEOX	Dry	5,670	5,670	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_, Describe:________________

Population within 1 mile: 1-10_X_; 10-30___; 30-100___; 100-300___; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments________________

Evidence of recreational use on site: Yes_X_, No___, Describe: Camp sites and use of cabin.

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes_X_, No___, Comment Bald Eagle
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage_X_; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High_X_, Medium___, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _2_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_3_, types and locations: Adits #3, #4B, and #5

Hazardous structures: Yes___, No_X_, Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No_X_, Number____, types and locations:________________

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____, Number_All_, types and locations: Dumps are at angle of repose.

Fire and/or Explosion hazards: Yes___, No_X_, Explain:________________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for the SE SW Section 26 site, Prepared by Chen-Northern, October 21, 1989.

USGS, Topographic Map, Old Baldy Mountain, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

SE SW S26
PA NO. 29-474

SE SW Section 26 PA# 29−474
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER – TUESDAY
INVESTIGATION DATE: 06/16/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29−474−WR−1	726	156	15.8 J	19.8	63.7	205	24000	2.23	2590	136	14400	7 J	2300	NR
29−474−WR−2	1930	220	0.5 U	37.1	67	133	42600	2.92	1110	142	185	9 J	164	NR
29−474−WR−3	2450	249	57 J	21.8	58.6	650	47100	0.587	3550	83	4360	13 J	8210	NR
29−474−WR−4	4650	168	52.4 J	18.2	20.2	509	57400	0.544	2670	41	5670	10 J	7660	NR
BACKGROUND	26	154	8.6 JX	15.3	26.1	29.6	20200	0.021	1240	43	89	4 UJ	70	NR

U – Not Detected; J – Estimated Quantity; X – Outlier for Accuracy or Precision; NR – Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29−474−WR−1	0.03	0.94	75.5	74.6	0.01	<0.01	0.02	0	75.5
29−474−WR−2	<0.01	0	61.6	61.6	<0.01	<0.01	0.01	0	61.6
29−474−WR−3	0.14	4.37	36.3	31.9	0.12	<0.01	0.03	0	36.3
29−474−WR−4	0.51	15.9	24.8	8.9	0.46	0.02	0.03	0.62	24.2

LEGEND

WR1 – Composite of subsamples WR1 through 6E.
WR2 – Composite of subsamples WR7 through 9.
WR3 – Composite of subsamples WR10, 11, and 13.
WR4 – Composite of subsamples WR14 through 17.
BACKGROUND – From NW SE Sec.26 (29−476−SS−1).

XRF ANALYSIS RESULTS

SE SW S26
PA NO. 29-474

Mine Name: SE SW Section 26 PA# 29-474
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-474-WR4-A		20086	5842.41	2225.09	240.048 *	5041.25	40808.4		289.347	1894.52		293.338
29-474-WR4-B	645.852 *	47203.8	7294.27	4178.03	137.346 *	2618.47	42194.3		233.673 *	2282.4	433.327 *	248.802
29-474-WR6-A		54251.6	7983.92	4079.36		1714.88	45068.7		308.55	1814.28	453.636 *	472.971
29-474-WR6-B		49191.2	3915.85	4072.1	225.955 *	3506.19	50194.9		373.254	2391.13	2417.23	321.103
29-474-WR6-C		35939.3	6046.51	3262.47	192.596 *	992.686 *	19602.6		135.877 *	3834.68	176.805 *	263.053
29-474-WR6-D	408.596 *	53886.2	4307.66	4474.97	133.817 *	496.918 *	32681		302.064	570.388	1234.27	334.186
29-474-WR6-E		43122.6	3756.49	3671.38	191.307 *	1111.23 *	26579.4		181.094 *	660.965		267.521
29-474-WR-1	1189.53 *	11483.7	31640.3	2082.47		628.792 *	51398.3			1031.37		139.322
29-474-WR-10		15256.5	9827.75	2091.37	200.093 *	1245.36 *	39687.1		295.816	4862.25	1155.08	166.031
29-474-WR-11		12816.2	12004.2	2451.9	231.691 *	4111.52	40460.3		57.3445 *	3114.38	555.039	87.7092
29-474-WR-12	311.496 *	47084.1	16894.3	2456.33	316.293 *		31511.5			41.0623 *		71.4855
29-474-WR-13		18542.2	6590.99	2366.92	183.335 *	4569.8	49840.4		373.668	11655.2	1589.87	55.1254
29-474-WR-14		33444.4	2824.75	1241.31	147.573 *	589.52 *	47041.4		77.5742 *	536.41	5934.77	29.7564
29-474-WR-15		16156.2	12611	3792.43		6713.27	100345		762.65	10599	4565.83	70.747
29-474-WR-16		29636.1	3964.89	1896.38	303.831 *	1659.82	45423.2		157.994 *	924.408	1828.67	87.645
29-474-WR-17		26757.4	5566.04	2230.1	112.699 *	5223.11	51933.3		136.447 *	2536.34	184.451 *	50.7795
29-474-WR-1-COMP	349.336 *	29052.4	10359.7	2445.53	227.763 *	1565.81	32312.6		120.616 *	1636.23		207.874
29-474-WR-2	647.147 *	13509.5	15913.7	1590.71	452.493	6394.5	50107.1		257.089	4265.77	420.217 *	149.414
29-474-WR-2-COMP	452.87 *	19231.5	20641.4	3038.28	211.091 *	929.362 *	55549.8		78.9577 *	184.776	1702.14	57.9444
29-474-WR-3	418.196 *	38135.6	9046.66	4780.85	182.22 *	3574.78	50190.1		369.921	1348.85	709.644 *	701.746
29-474-WR-3-COMP	295.402 *	18376.1	10029.4	2755.99	233.618 *	3479.73	46447.7		283.668	5596.53	1361.6	112.17
29-474-WR-4-COMP		19113.2	6944.12	1699.69	235.726 *	4152.02	64497.4		298.147	4381.23	3518.37	42.57
29-474-WR-5	837.017 *	15912	36101.1	2169.37	542.006	2181.81	48827.6		177.517 *	1599.87	564.282 *	237.746
29-474-WR-7		15802.4	43280.6	4102.54	309.914 *	1292.73 *	50042		87.5091 *	109.919 *	1265.22	42.4913
29-474-WR-8		16791.9	9209.24	3453.36	215.21 *	838.4 *	53004.1		151.544 *	192.838	2073.98	50.8721
29-474-WR-9		22720.1	5276.54	1401	272.015 *	375.344 *	48785.1		80.8901 *	307.52	1701.46	49.2294

Mine Name: SE SW Section 26 PA# 29-474
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-474-WR4-A	374.93			5311.53	54.8384 *		90.6074 *	100.048	278.623 *	13.6384 *	19.8532 *
29-474-WR4-B	249.098			8331.39	133.1		163.89	212.379	910.182	14.2637 *	
29-474-WR6-A	204.445			8657.77	183.966		128.932 *	276.115	736.723 *	19.4591 *	
29-474-WR6-B	223.95			9743.22	133.747		100.983 *	138.224	864.229 *	23.0999 *	
29-474-WR6-C	347.53			3268.68	93.3929		77.0887 *	110.012	290.355 *	16.5185 *	
29-474-WR6-D	271			4102.52	150.982		76.7408 *	170.347	551.575 *	19.5829 *	
29-474-WR6-E	292.367			7692.81	120.394		184.579	227.845	585.039 *		21.3246 *
29-474-WR-1	50.6913			152.298	55.6762		45.881 *	305.278	246.882 *		
29-474-WR-10	95.1811			1450.57	93.8863		57.3785 *	195.912	237.933 *		
29-474-WR-11	40.8484			966.634	75.5229		43.6088 *	404.616	279.083 *		
29-474-WR-12	112.725			33.7931 *	154.544		47.9565 *	364.354	402.858 *	11.5268 *	7.46999 *
29-474-WR-13	101.051			1769.09	91.1386		48.256 *	146.874	218.96 *		
29-474-WR-14	52.5998			2998.32	116.794		60.6177 *	159.696	330.954 *		
29-474-WR-15	130.264			6196.61	59.706 *		135.196 *	249.512	1094.7		
29-474-WR-16	101.096			3029.04	121.231		54.2581 *	475.297	336.383 *		16.5645 *
29-474-WR-17	86.1441			1975.44	105.574		74.3351 *	375.041	462.341 *	14.0568 *	
29-474-WR-1-COMP	179.332			4417.31	115.724		70.9783 *	193.078	283.67 *	12.9861 *	16.0354 *
29-474-WR-2	65.7102			7366.53	54.5302 *		75.0228 *	247.284	563.871 *	15.0904 *	
29-474-WR-2-COMP	99.949			186.894	95.6121		125.507 *	271.858	602.918 *		
29-474-WR-3	421.297			15051.1	104.967		134.014 *	138.384	797.638 *	17.1814 *	
29-474-WR-3-COMP	76.9319			1779.98	96.818		63.6805 *	278.085	215.309 *		
29-474-WR-4-COMP	79.1024			3824.95	73.1812		64.1064 *	248.952			
29-474-WR-5	115.303			4341.56	66.7607		126.304 *	311.445	579.464 *		
29-474-WR-7	58.1768				97.4222		68.7801 *	235.844	261.734 *		
29-474-WR-8	56.0231			65.9104 *	89.4628		61.8524 *	273.462	375.495 *		
29-474-WR-9	105.317			276.576	122.606		164.248	433.745	936.676		

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

SE SW S26
PA NO. 29-474

AIMSS SCORESHEET

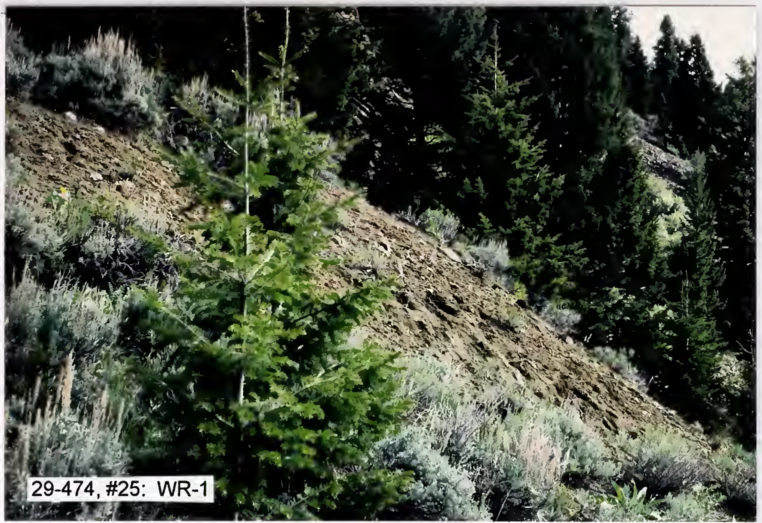
SITE NAME: SE SW SECTION 26
PA NUMBER: 29-474

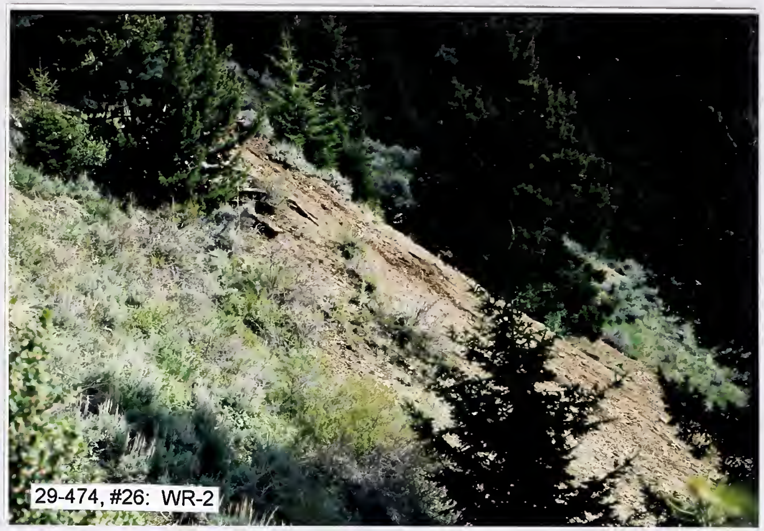
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	85.239
6	GW - TARGETS	WELLS - 1 MI. x 2.5		5.0
7		WELLS - 1 TO 4 MI		144
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	149.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	2540122
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		10
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	200
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	200
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	91.935
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		0
21		IRRIGATION/STOCK		0
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	16
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	294192
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.698
29	AIR - TARGETS	POPULATION - 4 MILES		30
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	45
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	8321
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		50
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	150
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	3.440
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		1
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		2
43		TARGETS SCORE	SUM LINES 40 THRU 42	3
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	1548
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE** (LINES 10 + 24 + 35 + 44) / 100,000			**28.44**

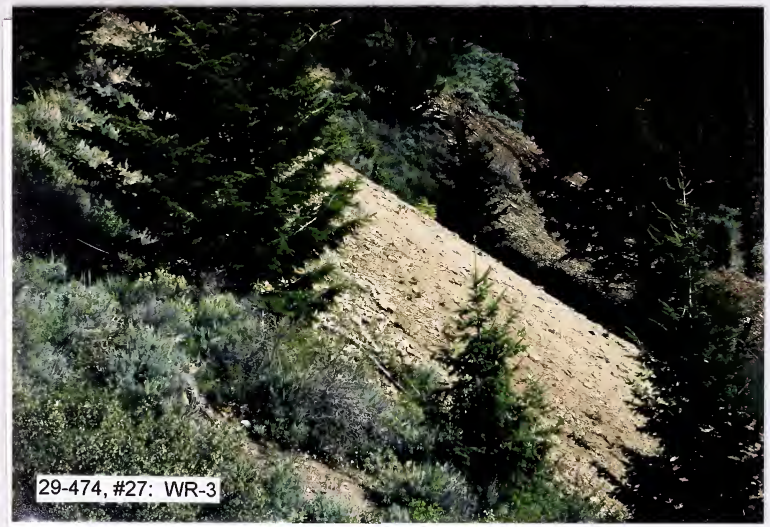
SITE NAME: SE SW SECTION 26
PA NUMBER: 29-474

SITE SAFETY

LINE NO.				
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	150
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	150
9		POPULATION - 1 MILE		1
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		2
12		TARGETS SCORE	SUM LINES 9 THRU 11	3
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**9.00**


29-474, #25: WR-1


29-474, #26: WR-2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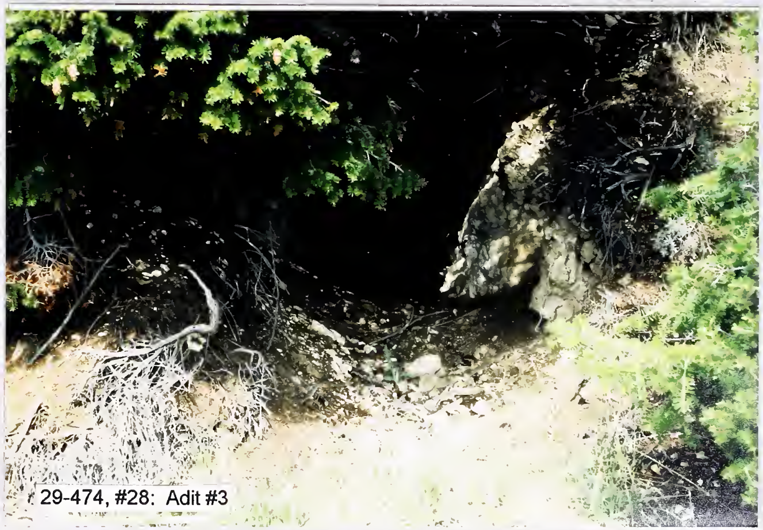
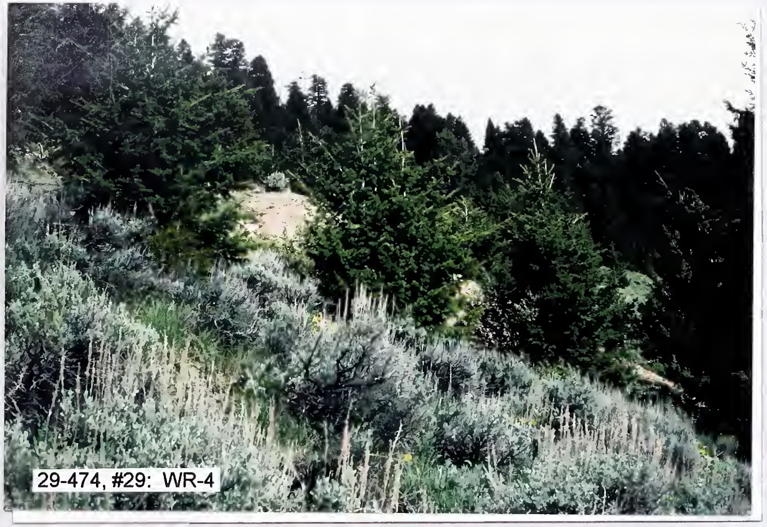
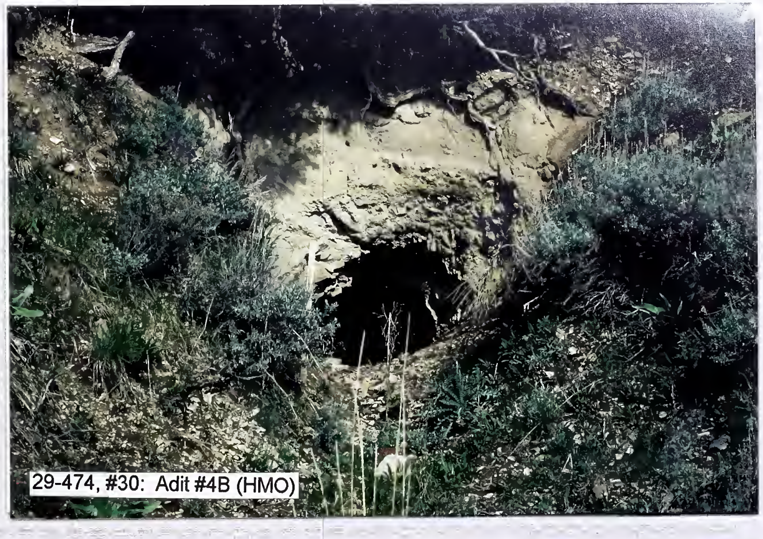
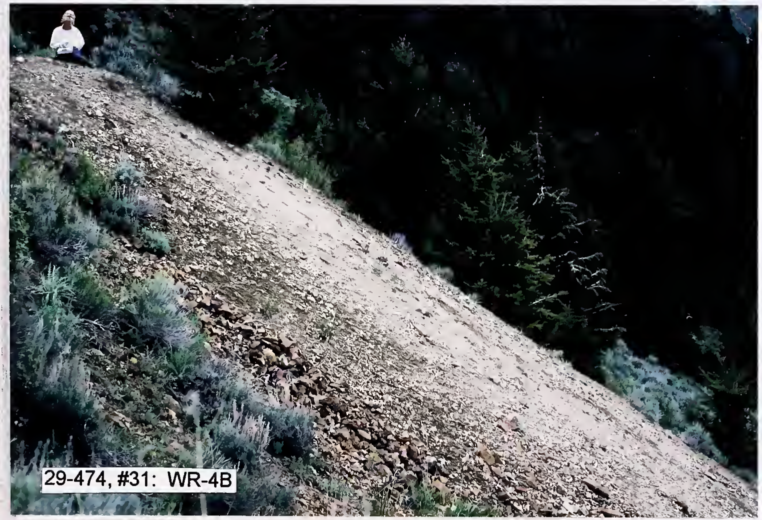
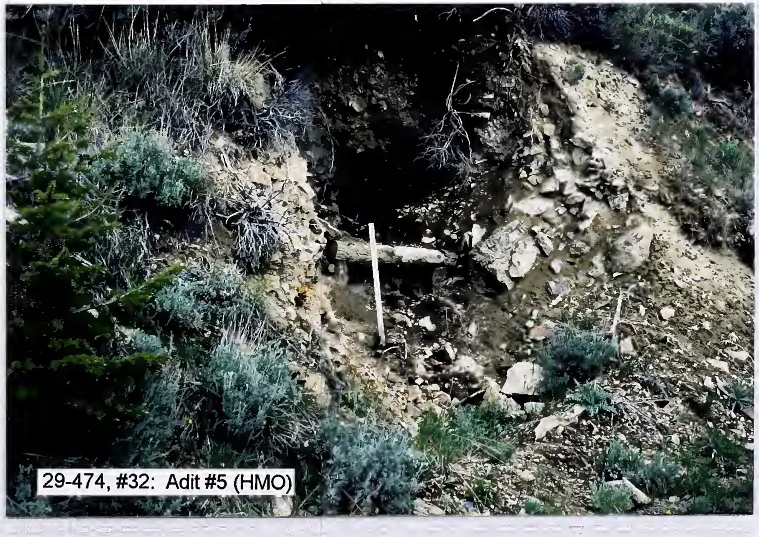

29-474, #28: Adit #3


29-474, #29: WR-4


29-474, #30: Adit #4B (HMO)


29-474, #31: WR-4B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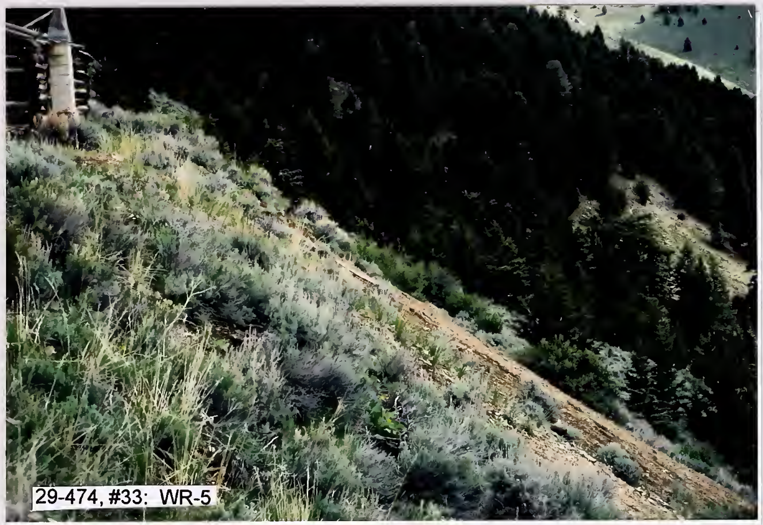
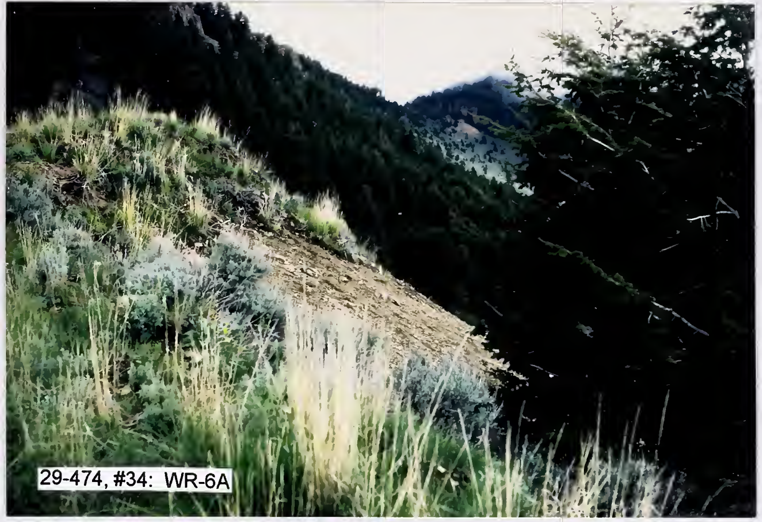
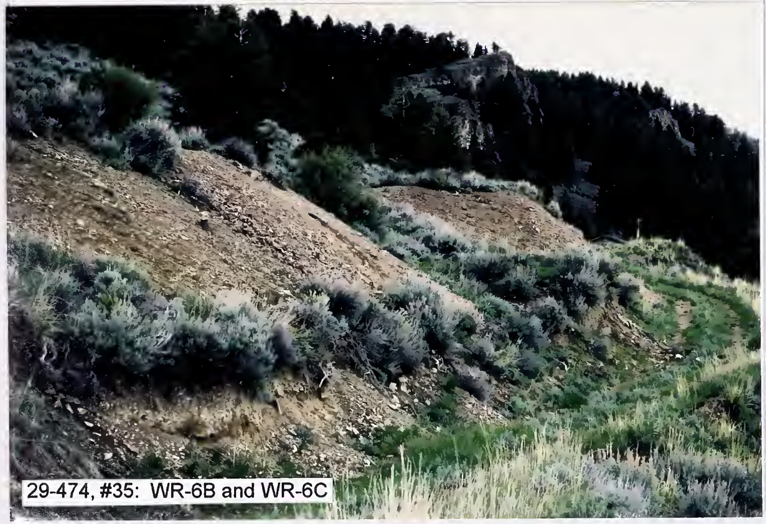
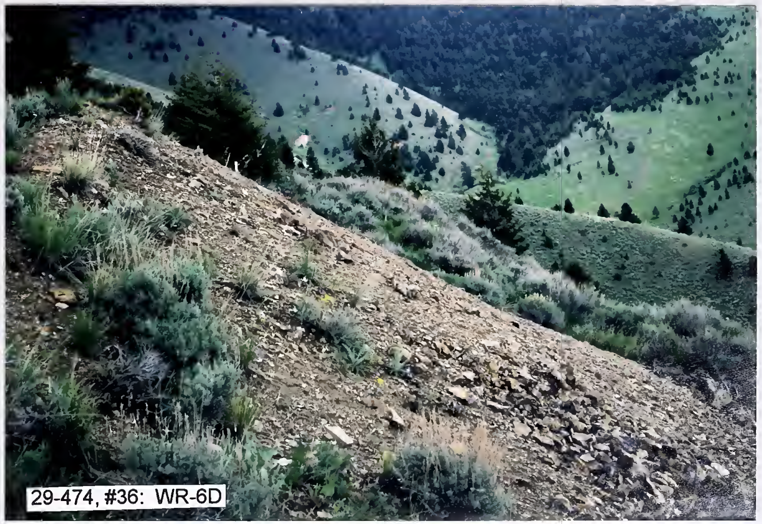
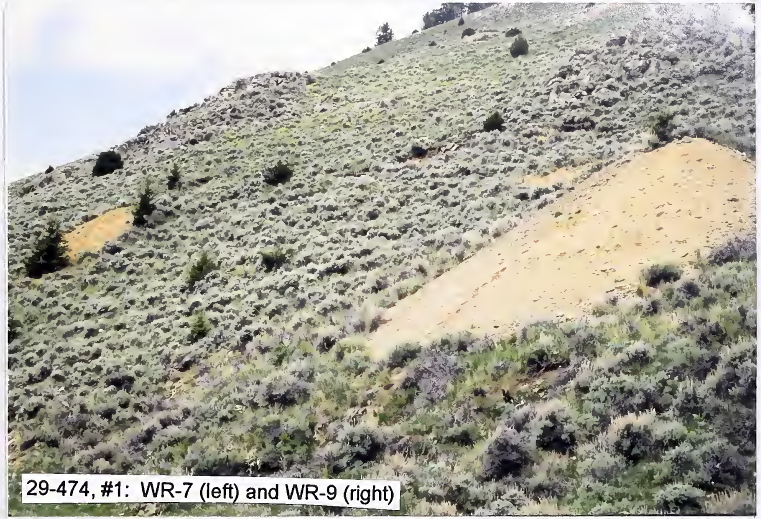

29-474, #33: WR-5


29-474, #34: WR-6A


29-474, #35: WR-6B and WR-6C


29-474, #36: WR-6D

29-474, #37: WR-6E


29-474, #1: WR-7 (left) and WR-9 (right)

29-474, #2: WR-8 (Chen-Northern #1)

29-474, #3: WR-10

29-474, #4: WR-11

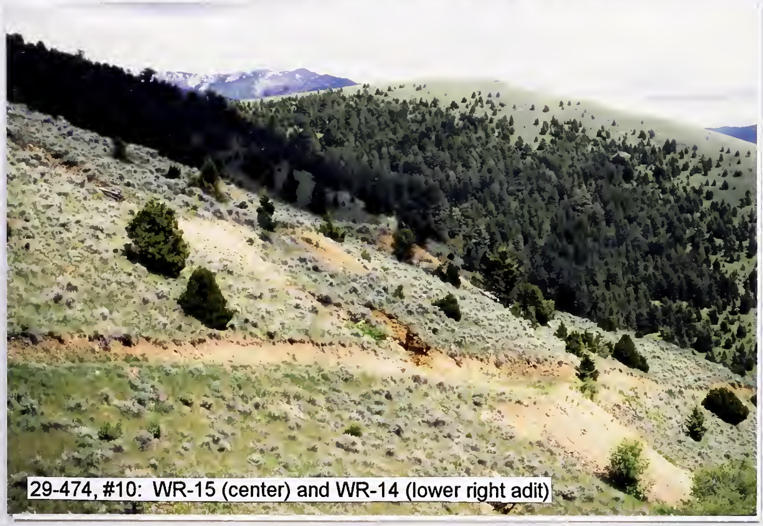
29-474, #5: WR-12

29-474, #6: WR-13

29-474, #7: WR-17

29-474, #8: WR-16

29-474, #9: WR-14



29-474, #10: WR-15 (center) and WR-14 (lower right adit)

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: NW SE S26 PA#: 29-476

Date: June 17, 1993 Time: 1530

Field Team Leader: Babits, Pioneer

Sampling Personnel: Tuesday, Belanger, Clark,
Lasher; Pioneer
Pierson; TD&H

Visitors: None

Weather/Seasonality Observations: Warm (60°F); partly cloudy; slight breeze; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): #17: WR-4; #18: Adit at WR-4; #19: WR-5; #20: Argenta WR-6, -7, and -8; #21: Dumps below WR-8 (not sampled); #11: SW-3 and SE-3 sample location upgradient in Wet Georgia Gulch; #12: SW-4 and SE-4 sample location downgradient in Wet Georgia Gulch. Video Tape No. 1

General Comments/Observations (not covered specifically in attached Inventory Forms): Site is also referred to as "Argenta".

Other Hazardous Materials/Substances Present: N/A

General Comments on Potential Remedial Alternatives: Waste rock could be reprocessed for lead.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): NW SE S26 PA#: 29-476

Legal Description: T 3S ;R 5W ;Sec. 26 ,NW 1/4 SE 1/4 ___ 1/4

County: MADISON Mining District: SHERIDAN

Latitude: N 45° 32' 50" Longitude: W 112° 10' 42"

Primary Drainage Basin and Code: Ruby River/10020003
Secondary Drainage Basin: Wet Georgia Gulch

USGS Quadrangle map name(s): Old Baldy Mountain

Mine Type/Commodities: Hardrock/Gold

Activity Status: Active ___, Inactive/Exploration ___, Abandoned X .

Ownership status: Known YX N __; private/public? Public
Owner, Agent, or Contact (Include address and phone when available): USFS

Relationship to other mines/sites in the area/district: Numerous mines are located in the area.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? MDSL P.A. Nos. were found on stakes at the site.

General site features: Elevation 7600'-8000', Slope Approx. 30° , Aspect South and East

Land use: Mining X , Recreational ___, Residential ___, Urban ___, Agricultural X , Other(Specify)

Area of disturbed/unvegetated lands? 0.75 acres.
Dimensions:

Predominant vegetation types: Grasses, pines

Access: roads - good ___, poor ___, 4wd X , trail X .
Other logistical considerations (proximity to other sites). 4WD to lower workings; 0.5 mile hike to upper workings.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are no well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). Site is underlain by schist and gneiss interbedded with quartz and limestone. The site lies on the west side of intermittent Wet Georgia Gulch. Wet Georgia Gulch flows mostly southwest to south past the site. Wet Georgia Gulch meets the Ruby River approx. 8 to 9 miles below the site.

Mining/milling history, ore type/tenor, host rock, gangue: No information available.

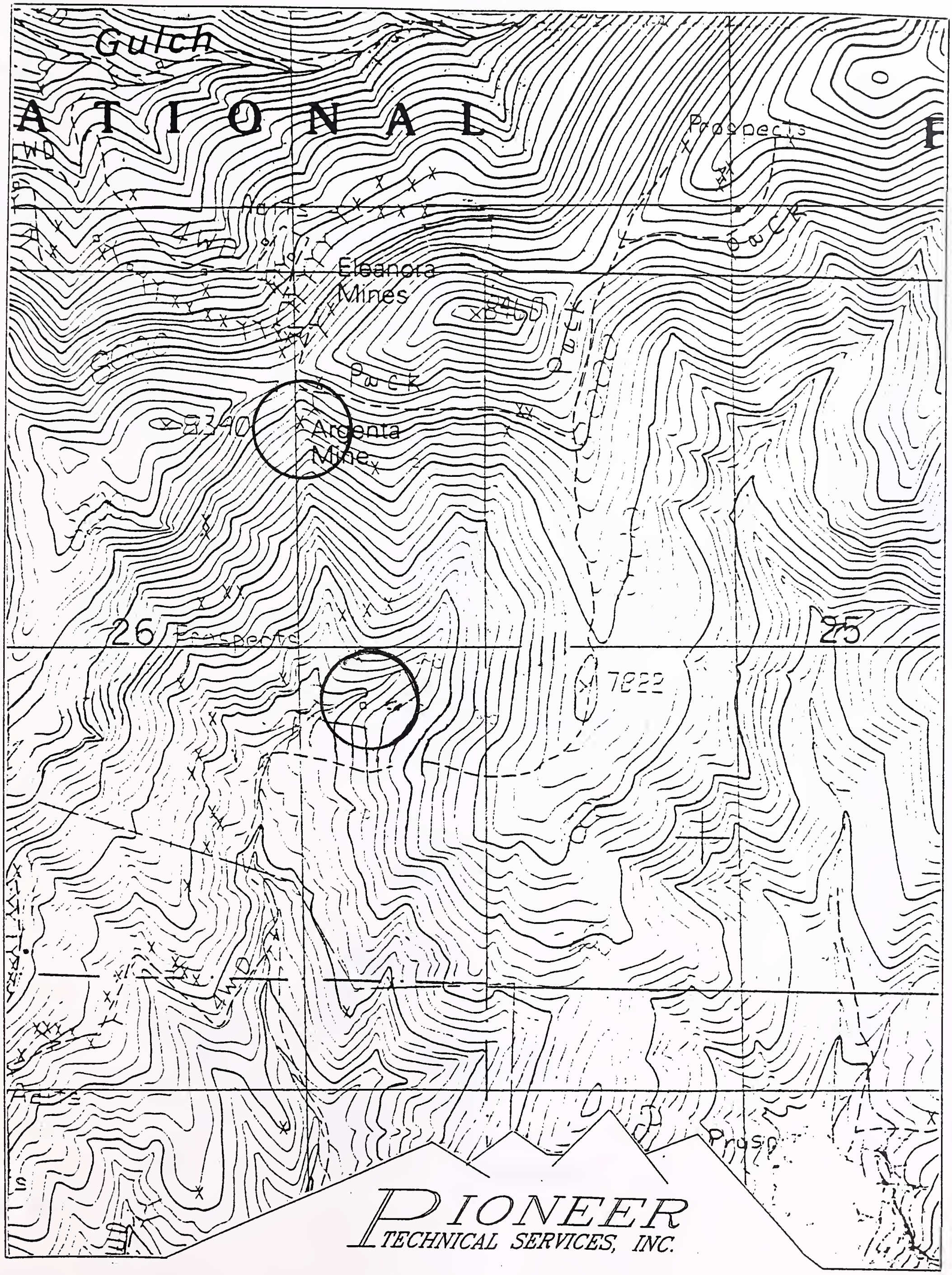
Mine Operation?
Shafts - Yes___, No X , # ____, Comment
Adits - Yes X , No___, # 14 , Comment 2 partially open
Pits - Yes___, No X , # ____, Comment
Placers - Yes___, No X , # ____, Comment
Other - Yes___, No X , # ____, Comment

Mill Operation? Yes___, No X . If yes answer the next three questions:

Period(s) of Operation: N/A

Origin of Ore Milled - Custom Mill___ Dedicated Mill___; Number and names of mines that supplied mill feed: N/A

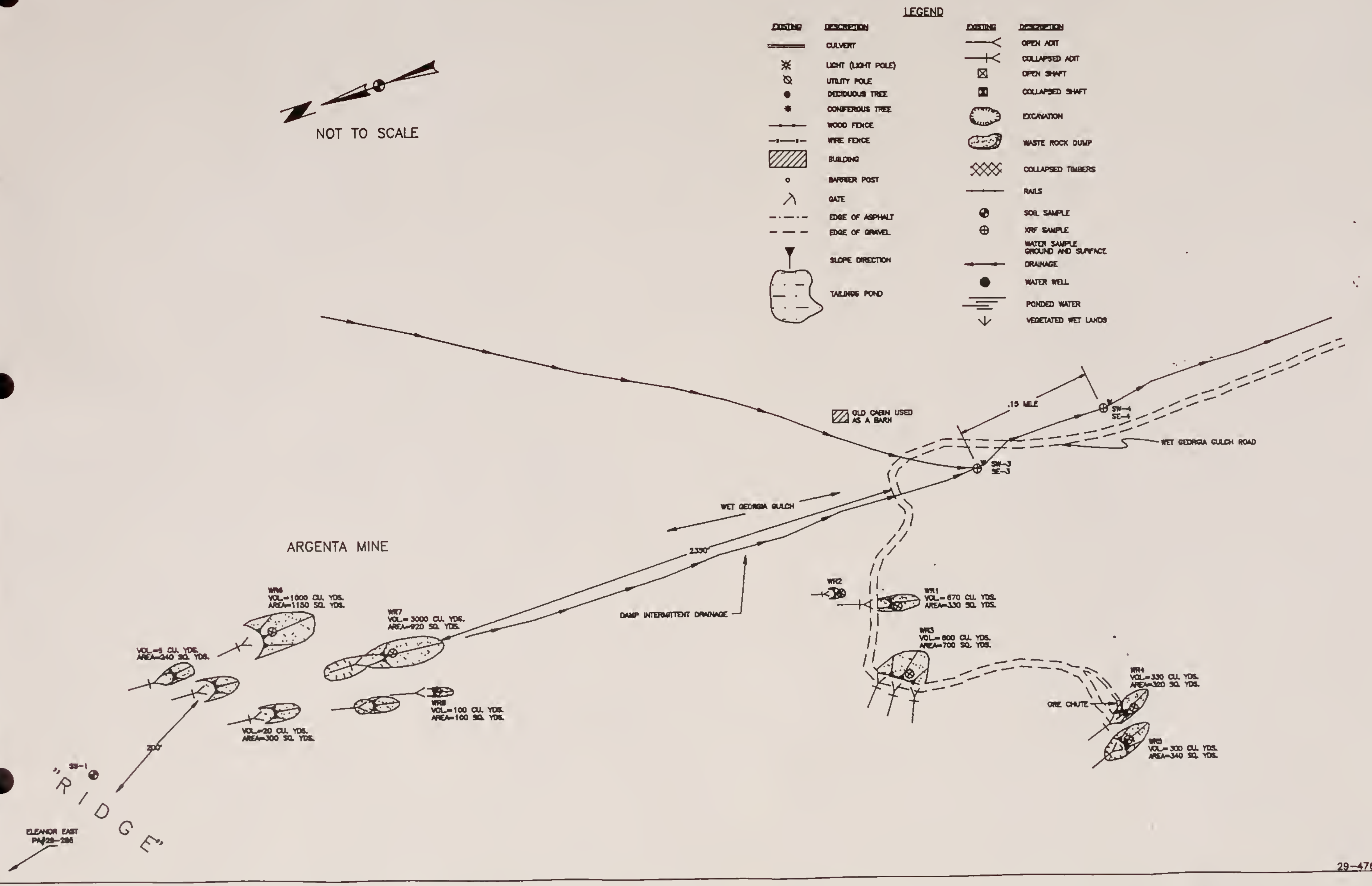
Process? Hg-amalgam, CN⁻ leach (vat, heap), floatation, smelting?
N/A



NW SE S26, P.A. NO. 29-476

T03S, R05W, SECTION 26

SCALE: 1" = 1000'



PIONEER TECHNICAL SERVICES INC. BUTTE MT.

DRAWN JTP DATE 20 OCT 93
DESIGNED TPR JOB NO. 93-17
APPROVED WJB F.B. NO.

TDH

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS–BOZEMAN–KALISPELL MONTANA
SPOKANE WASHINGTON

MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY
NW SE SECTION 26 PA# 29-476
SHERIDAN DISTRICT MADISON COUNTY

SHEET NO.

29-476.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution (approximate % sand, silt, & clay): N/A

Determine tailings impoundment depth and describe stratification of the tailings if observable (based on texture and color): N/A

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): N/A

Describe condition of the tailings impoundment (Note condition of dams or structures, location of breaches): N/A

Comments on potential for mitigation: N/A

SOURCE INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
WR-1	WR	570	Southeast side of WR-1	None	5.8 (D)	0.03	29-476-WR-1	06/17/93 1000	T-Metals, ABA
WR-2	WR	Small	South side of WR-2	None	6.5 (D)	0.03			
WR-3	WR	600	Southeast side of WR-3	None	5.8 (D)	0.03			
WR-4	WR	330	East side of WR-4	None	6.6 (D)	0.06	29-476-WR-2	06/17/93 1010	T-Metals, ABA
WR-5	WR	300	East side of WR-5	None	5.8 (D)	0.02			
WR-6	WR	1,000	Southeast side of WR-6	None	6.6 (D)	0.06	29-476-WR-3	06/17/93 1010	T-Metals, ABA
WR-7	WR	3,000	South side of WR-7	None	6.8 (D)	0.04			
WR-8	WR	100	South side of WR-8	None	6.2 (D)	0.06			
SS-1	BKGRND	N/A	Background soil on top of hill upgradient of WR-6	N/A	N/A	N/A	29-476-SS-1	06/17/93 1606	T-Metals

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-476-WR-1 is composite of WR-1, -2, and -3. 29-476-WR-2 is composite of WR-4 and -5. 29-476-WR-3 is composite of WR-6, -7, and -8.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:______________

Filled shafts: Yes___, No X , Number:____ Identification:______________

Seeps/Springs: Yes___, No X , Number:____ Identification:______________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 79

Distance to nearest well used for drinking? 4 miles

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Uncontained sources with some elevated metal values, but depth to groundwater is probably not shallow.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

____

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes X, No ___, Name(s): Wet Georgia Gulch from Argenta complex only runs intermittently.

Dry streambeds: Yes X, No ___, Name(s): Two unnamed off of mine area.

Other surface water: Yes ___, No X, Name(s)/Description: ___

Waste materials within any floodplain: Yes X, No ___ Source ID(s): WR-6, WR-7, and WR-8 are in dry drainage.

Approximate Flood frequency? X 1 yr, ___ 10 yr, ___ 100 yr

Estimated seasonal flow of stream(s) (cfs)? 2 gpm during sampling
High Flow: 30 gpm, Average Flow: 3 gpm

Distance between waste source(s) and nearest surface water body (ft)? There is 1,000 feet between WR-7 and where water appears in Wet Georgia Gulch.

Surface water draining onto or through waste sources: Yes ___, No X,
Describe: ___

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishery, wetland, irrigation, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes ___, No X, Distance downstream (ft)? ___ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
None were observed during investigation.

SURFACE WATER INVENTORY FORM

SAMPLERS: Tuesday, Belanger, Clark

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
SW-3	SW	Wet Georgia Gulch at confluence from Argenta	8.06	357	70	12.0	181	2 gpm (E)	29-476-SW-3	06/17/93 1705	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-3	SE	Wet Georgia Gulch at confluence from Argenta	N/A	N/A	N/A	N/A	N/A	N/A	29-476-SE-4	06/17/93 1705	T-Metals
SW-4	SW	Downstream from ore chute and workings	8.3	362	63	12.8	185	2 gpm (E)	29-476-SW-4	06/17/93 1725	T-Metals, TDS, Hardness, Cl, SO4, NO2/NO3
SE-4	SE	Downstream from ore chute and workings	N/A	N/A	N/A	N/A	N/A	N/A	29-476-SE-4	06/17/93 1725	T-Metals

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? None

Wetlands present: Yes X, No ___, Describe: Very limited to streambank

Carbonate rocks/soils: Yes X, No ___, Describe: Limestone

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10 ___; 10-30 X; 30-100 ___; 100-300 ___; 300-1,000 ___; 1,000-3,000 ___; 3,000-10,000 ___; 10,000 or greater ___; Comments ___

Nearest residence(ft or miles)? 4 miles

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: Babits, Pierson, Lasher

SOURCE I.D. NO.	ACID MINE DRAINAGE CHARACTERISTICS (LIST)	MOISTURE CONTENT (WET/DRY/PARTIAL)	SURFACE AREA (SQUARE FEET)	UNCOVERED/UNVEGETATED AREA (SQUARE FEET)	AVAILABLE FINES (YES/NO)	DUST PROPAGATION POTENTIAL (OBSERVED/HIGH /MODERATE/LOW/NONE)
WR-1	SO4	Wet	2,970	2,375	Yes	Low
WR-2	SO4	Wet	Small	Small	Yes	Low
WR-3	SO4	Wet	6,300	5,040	Yes	Low
WR-4	None	Wet	2,880	2,304	Yes	Low
WR-5	None	Wet	3,060	2,448	Yes	Low
WR-6	None	Wet	10,350	8,280	Yes	Low
WR-7	SO4	Wet	8,280	6,624	Yes	Low
WR-8	None	Wet	900	720	Yes	Low

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No X ,
Describe:________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments None

Evidence of recreational use on site: Yes___, No X , Describe:________

Accessibility - Fences, warning signs, closed roads? Unrestricted

Sensitive environments on-site or adjacent to site:

State or National Parks - Yes___, No X , Comment________
Wilderness Area - Yes___, No X , Comment________
T&E Species Habitat - Yes X , No___, Comment Bald Eagle
Bat Habitat - Yes X , No___, Comment________

Primary Drainage X ; Secondary Drainage___; No Information___:

Riparian Habitat Quality - High___, Medium X , Low___
Wetlands Frontage - High X , Medium___, Low___
Fisheries Habitat and Species Classification - 4
Sport Fishery Classification - 2

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes X , No___, Number 2 , types and locations:
Very inaccessible at Argenta (8,000 feet)

Hazardous structures: Yes___, No X , Number____, types and locations:_

Unstable highwalls, pits, trenches, slopes: Yes___, No X , Number____,
types and locations:________

Unstable waste piles, impoundments, undercut banks: Yes X , No____,
Number 9 , types and locations: Waste piles are sloughing.

Fire and/or Explosion hazards: Yes___, No X , Explain:________

Bibliography

MBMG, Well Log Database, September 8, 1993.

MDFWP, Montana Rivers Information System Rivers Report, Version 2.0, Prepared by Montana Natural Resource Information System, December 1989.

MDSL/AMRB Files, Abandoned Mine Reclamation Inventory Field Form for NW SE Sec. 26, Prepared by Chen-Northern, October 21, 1989.

USGS, Mining Districts of the Dillon Quadrangle, Montana, and Adjacent Areas, Bulletin No. 574, Written by Alexander N. Winchell, 1914.

USGS, Topographic Map, Old Baldy Mountain, Montana, 7 1/2 minute Quadrangle, 1989.

LABORATORY ANALYTICAL DATA

NW SE S26
PA NO. 29-476

NW SE Section 26 PA# 29−476
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 06/17/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29−476−SE−3	14	83.9	0.6 UJX	10.4	65.1	15.5	16000	0.02 U	140	55	31	4 UJ	84	NR
29−476−SE−4	20	145	1 JX	15.1	83.5	22.1	25700	0.017 U	473	62	66	4 UJ	112	NR
29−476−WR−1	169	262	16 JX	19.5	52.8	48.7	35400	0.334	2260	79	504	4 UJ	2240	NR
29−476−WR−2	832	417	19.6 JX	30.2	238	187	44000	0.091	3670	231	3790	4 UJ	2250	NR
29−476−WR−3	27	139	1.5 JX	33	21.4	98.1	21000	0.477	855	43	2930	3 UJ	201	NR
BACKGROUND	26	154	8.6 JX	15.3	26.1	29.6	20200	0.021	1240	43	89	4 UJ	70	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29−476−WR−1	0.25	7.81	96.4	88.6	0.01	0.07	0.17	2.19	94.2
29−476−WR−2	0.53	16.6	73	56.4	0.11	0.14	0.28	4.37	68.6
29−476−WR−3	0.03	0.94	27.6	26.7	0.02	<0.01	0.02	0	27.6

WATER MATRIX ANALYSES

Metals in Water
Results in ug/L

FIELD ID	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Sb	Zn	HARDNESS CALC. (mg CaCO3/L)
29−476−SW−3	1.69 U	75.7	2.55 U	5.99 U	5 U	3.43 J	94.8	0.15	3.97	12.7 J	1.55 U	18.3 U	6 U	191
29−476−SW−4	1.95	75.2	6.07	5.99 U	5 U	1.35 U	309	0.15	6.57	8.78 U	1.55 U	18.3 U	6 U	182

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Wet Chemistry
Results in mg/l

FIELD I.D.	TOTAL DISSOLVED SOLIDS	CHLORIDE	SULFATE	NO3/NO2−N	CYANIDE
29−476−SW−3	222	< 5.0	9	0.23	NR
29−476−SW−4	207	< 5.0	9	0.25	NR

LEGEND

SE3 − Wet Georgia Gulch at confluence from Argenta.
SE4 − Downstream from ores and workings.
WR1 − Composite of subsamples WR1, 2, and 3.
WR2 − Composite of subsamples WR4 and 5.
WR3 − Composite of subsamples WR6, 7, and 8.
BACKGROUND − From NW SE S26 (29−476−SS−1).
SW3 − Same as SE3.
SW4 − Same as SE4.

XRF ANALYSIS RESULTS

NW SE S26
PA NO. 29-476

Mine Name: NW SE Section 26 PA# 29-476
XRF Field Analyses
Results in PPM

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-476-SS-1		17787.8	4298.1	1209.38	281.727 *	904.674 *	19131.2		55.3183 *	124.811 *	57.4879 *	45.7542
29-476-WR-1		25656.3	16647.1	1542.24	127.59 *	4648.48	28382			549.182	94.3283 *	51.3622
29-476-WR-1-COMP		21960	19600.8	1904.44	128.376 *	3831.11	40189.5			3344.39	121.888 *	100.653
29-476-WR-2		16277.6	19264	1624.61	185.855 *	784.422 *	33317.8			81.5246 *		120.317
29-476-WR-2-COMP	708.32 *	22132.3	19416.1	1813.01	725.706	3333.4	49269.7		136.902 *	1399.11	212.496 *	42.2843
29-476-WR-3		14759.5	18023.1	1562.17	203.099 *	838.837 *	33413.2			82.8787 *		107.796
29-476-WR-3-COMP	438.373 *	31472.9	35842.4	1764.43	214.548 *	572.797 *	35548.6			146.124 *		87.1391
29-476-WR-4	1368 *	12925.5	22756	1137.43	614.744	3618.86	52732.6		72.2142 *	1182.77	451.019	50.8131
29-476-WR-5		19686	28644.8	1890.97	203.57 *	3750.97	38238.8			5537.6	112.056 *	91.6444
29-476-WR-6	437.394 *	28895.9	44578.2	1749.89	343.005 *	829.344 *	33480.7			172.795		82.1233
29-476-WR-7		32514.3	1961.27	2551.41		1283.96 *	30674.1		412.974	995.549		155.35
29-476-WR-8		41143.6	2921.56	2937.34	259.034 *	1415.41	29907.2			141.32 *		42.9669

	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-476-SS-1	140.437		5.41957 *	35.597 *	84.9049		22.8563 *	263.791			
29-476-WR-1	60.1373			150.954	105.976			196.36	95.5209 *		
29-476-WR-1-COMP	75.8873			465.688	117.948			665.559			11.9268 *
29-476-WR-2	57.4893				87.0364			475.491			13.8087 *
29-476-WR-2-COMP	58.9387			1839.95	113.216		57.8806 *	431.061	413.416 *		
29-476-WR-3	50.0597				93.0465			724.196			9.29396 *
29-476-WR-3-COMP	142.301			852.072	136.248		43.1362 *	420.968	421.766 *	14.6475 *	
29-476-WR-4	37.5081			1306.87	50.0669 *			435.841			
29-476-WR-5	101.518			506.079	111.482			459.613			
29-476-WR-6	126.422			59.9591 *	126.705		47.0785 *	489.489	340.634 *	11.3515 *	
29-476-WR-7	168.813			7932.61	115.28			138.346	134.282 *		
29-476-WR-8	155.107			94.5288	184.047		43.1661 *	329.229	295.898 *		

* – Estimated Quantity
$ – Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

NW SE S26
PA NO. 29-476

MDSL AMRB/PIONEER 4/9/93

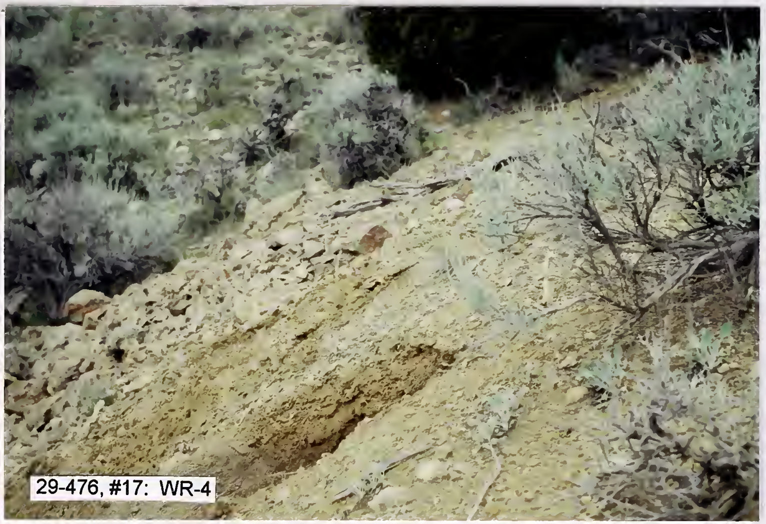
AIMSS SCORESHEET

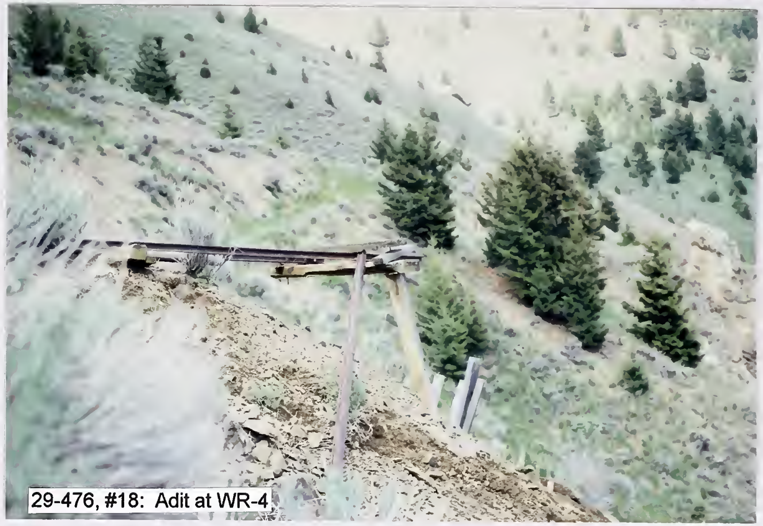
SITE NAME: NW SE SECTION 26
PA NUMBER: 29-476

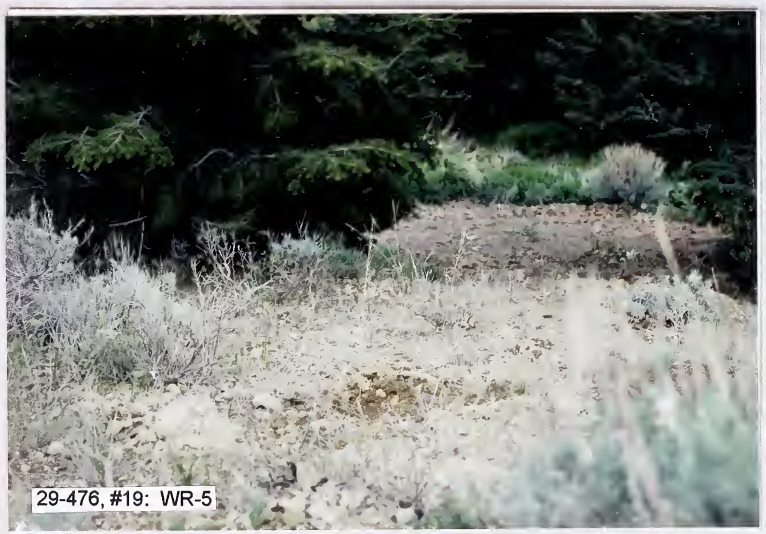
LINE NO.				
		GROUNDWATER PATHWAY		
1	GW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A		CONTAINMENT		20
3B		GW DEPTH		10
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	200
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	200
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	10.635
6	GW - TARGETS	WELLS - 1 MI. x 2.5		0.0
7		WELLS - 1 TO 4 MI		79
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	79.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	168033
		SURFACE WATER PATHWAY		
11	SW - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
12		EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	11.674
16	SW - TARGETS	DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19		FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	23
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	10740
		AIR PATHWAY		
25	AIR - LIKELIHOOD OF RELEASE	OBSERVED RELEASE		0
26A		CONTAINMENT		10
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	50
27		LIKELIHOOD SCORE	LINES 25 + 26C	50
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.373
29	AIR - TARGETS	POPULATION - 4 MILES		10
30		NEAREST RESIDENCE		0
31		WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	25
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	466
		DIRECT CONTACT PATHWAY		
36	LIKELIHOOD OF EXPOSURE	OBSERVED EXPOSURE		0
37A		ACCESSIBILITY		20
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	100
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.340
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		0
43		TARGETS SCORE	SUM LINES 40 THRU 42	0
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0
45	**TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**	(LINES 10 + 24 + 35 + 44) / 100,000		**1.79**

SITE NAME: NW SE SECTION 26
PA NUMBER: 29-476

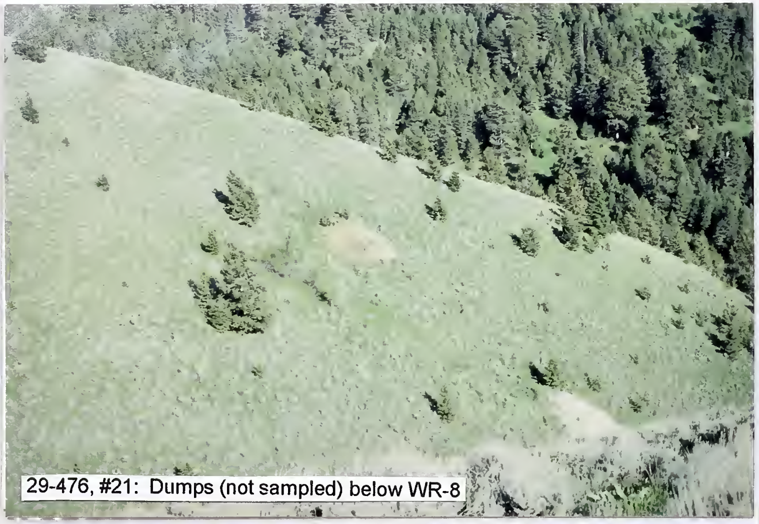
LINE NO.		SITE SAFETY		
1	THREAT	ACCESSIBILITY		20
2		OPEN SHAFTS	100 EA.	0
3		OPEN ADITS	50 EA.	100
4	HAZARDS	UNSTAB. HIWALLS / PITS	75 EA.	0
5		HAZ. STRUCTURES	40 EA.	0
6		EXPLOSIVES		0
7		HAZ. MATERIALS		0
8		HAZARDS SCORE	SUM LINES 2 THRU 7	100
9		POPULATION - 1 MILE		0
10	TARGETS	NEAREST RESIDENCE		0
11		RECREATIONAL USE		0
12		TARGETS SCORE	SUM LINES 9 THRU 11	0
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**0.00**


29-476, #17: WR-4


29-476, #18: Adit at WR-4


29-476, #19: WR-5

29-476, #20: WR-6, WR-7, and WR-8



29-476, #21: Dumps (not sampled) below WR-8

29-476, #11: SW-3 and SE-3 sample location upgradient in Wet Georgia Gulch

29-476, #12: SW-4 and SE-4 sample location downgradient in Wet Georgia Gulch

SILVER STAR

MONTANA DEPARTMENT OF STATE LANDS
ABANDONED MINE RECLAMATION BUREAU

HAZARDOUS MATERIALS INVENTORY SITE INVESTIGATION LOG SHEET

Mine/Site Name: BROADWAY/VICTORIA PA#: 29-179

Date: September 17, 1993 Time: 0800

Field Team Leader: M. Babits, Pioneer

Sampling Personnel: Flammang, Pioneer
S. Babits, Pioneer

Visitors: None

Weather/Seasonality Observations: Partly cloudy; cool to warm (35° to 65°F); breezy; cool, wet spring and summer.

Photographic Log (Film Roll and Photo No.'s/Video Tape Number): Photos taken were misplaced. Video Tape No. 3

General Comments/Observations (not covered specifically in attached Inventory Forms): N/A

Other Hazardous Materials/Substances Present: There are twelve 55 gal. barrels of unknown white powder with yellow and green precipitate on top in the mill building. All barrels are open, two are leaking, and one is on its side.

General Comments on Potential Remedial Alternatives: Potential to reprocess tailings for lead and zinc, and waste rock for lead, zinc, and copper.

I. BACKGROUND INFORMATION

This information is to be collected to the extent practical prior to conducting the Site Investigation. Data gaps shall be filled in during the investigation.

Mine/Site Name(s): BROADWAY/VICTORIA PA#: 29-179

Legal Description: T 2S ;R 6W ;Sec. 2 , NW1/4 ___1/4 ___1/4

County: MADISON Mining District: SILVER STAR

Latitude: N 45° 41' 55" Longitude: W 112° 18' 45"

Primary Drainage Basin and Code: Jefferson River/10020005
Secondary Drainage Basin: Tom Benton Gulch

USGS Quadrangle map name(s): Silver Star

Mine Type/Commodities: Hardrock/Gold, Silver, Lead, Copper
Activity Status: Active ___ ,Inactive/Exploration X ,Abandoned ___ .

Ownership status: Known Y X N ___ ; private/public? Private
Owner, Agent, or Contact (Include address and phone when available): Mark Aplas, Berglynn Resources, Inc., 744 W. Hastings, Suite 316, Vancouver, British Columbia, Canada V6C 1A5.

Relationship to other mines/sites in the area/district: Keystone, Hudson, Delaware, Ajax, and Fagan sites are of the same contact deposit.

Regulatory Status (Activity by other agencies)? Hardrock permits? Past Reclamation Activities? Grates on two shaft areas; fences around one shaft and three highwalls; and, culvert closure on two adits by MDSL.

General site features: Elevation 5120'-5350' , Slope 5°-20° , Aspect Ranges from Northeast facing on south side of the site to Southeast facing on the west side and Southwest facing on the North and East sides of the site.

Land use: Mining X , Recreational ___ , Residential ___ , Urban ___ , Agricultural X , Other(Specify) ___

Area of disturbed/unvegetated lands? Approx. 7 acres.
Dimensions: Site dimensions are 2,000 feet x 1,800 feet.

Predominant vegetation types: Area is vegetated with native grasses and sagebrush.

Access: roads - good X ,poor ___ ,4wd ___ ,trail ___ .
Other logistical considerations (proximity to other sites). Gate at beginning of site was open at time of investigation, but could potentially be locked.

Well logs within 1 mile radius; water rights 15 mi downstream (Attach MBMG Well Log Printout(s): There are 32 well logs within a 1 mile radius.

General site geologic, hydrologic, and hydrogeologic settings (Also note presence of radioactive minerals). The site lies on the contact of Cambrian limestone and an offshoot of the Boulder Batholith (quartz monzonite). Site lies on two unnamed tributaries to Tom Benton Gulch, the ridge between the gulch, and the tributaries and Tom Benton Gulch. Both the tributaries and Tom Benton Gulch were dry during this site investigation. Water leaving the site would flow west in the gulch to the Jefferson River 1 1/3 miles away. Two piezometers were on-site with one at TP-3 and one at the base of TP-2; both had water. Depth to water was greater than 100 feet (length of the water level indicator).

Mining/milling history, ore type/tenor, host rock, gangue: First development work was done in bottom of Tom Benton Gulch. Previous to 1880, a total of 30,000 tons was extracted; 1/2 milled at Silver Star. Approx. 4,000 tons were shipped from 1899 to 1911 with average Au content, 1.69 oz./ton, and 1.18 oz./ton Ag. From 1930 to 1934, tailings from previous operation were shipped. Chief constituents of ore are jasperoid, earthy limonite, cuprite, malachite with some epidote, garnet, calcite, pyrolusite, and serpentine. Ores carried a few percent Cu and some Pb accompanied by Ag and free Au. Deposit is in contact of limestone and quartz monzonite.

Mine Operation?
Shafts - Yes X , No ___ , # 6 , Comment 2 grated; 1 fenced; 1 open; 2 shallow
Adits - Yes X , No ___ , # 8 , Comment Culvert closures on 2; 6 in highwall are inaccess.
Pits - Yes X , No ___ , # 5 , Comment 3 have fallen fences
Placers - Yes ___ , No X , # ___ , Comment ___
Other - Yes ___ , No X , # ___ , Comment ___

Mill Operation? Yes X , No ___ . If yes answer the next three questions:

Period(s) of Operation: Unknown

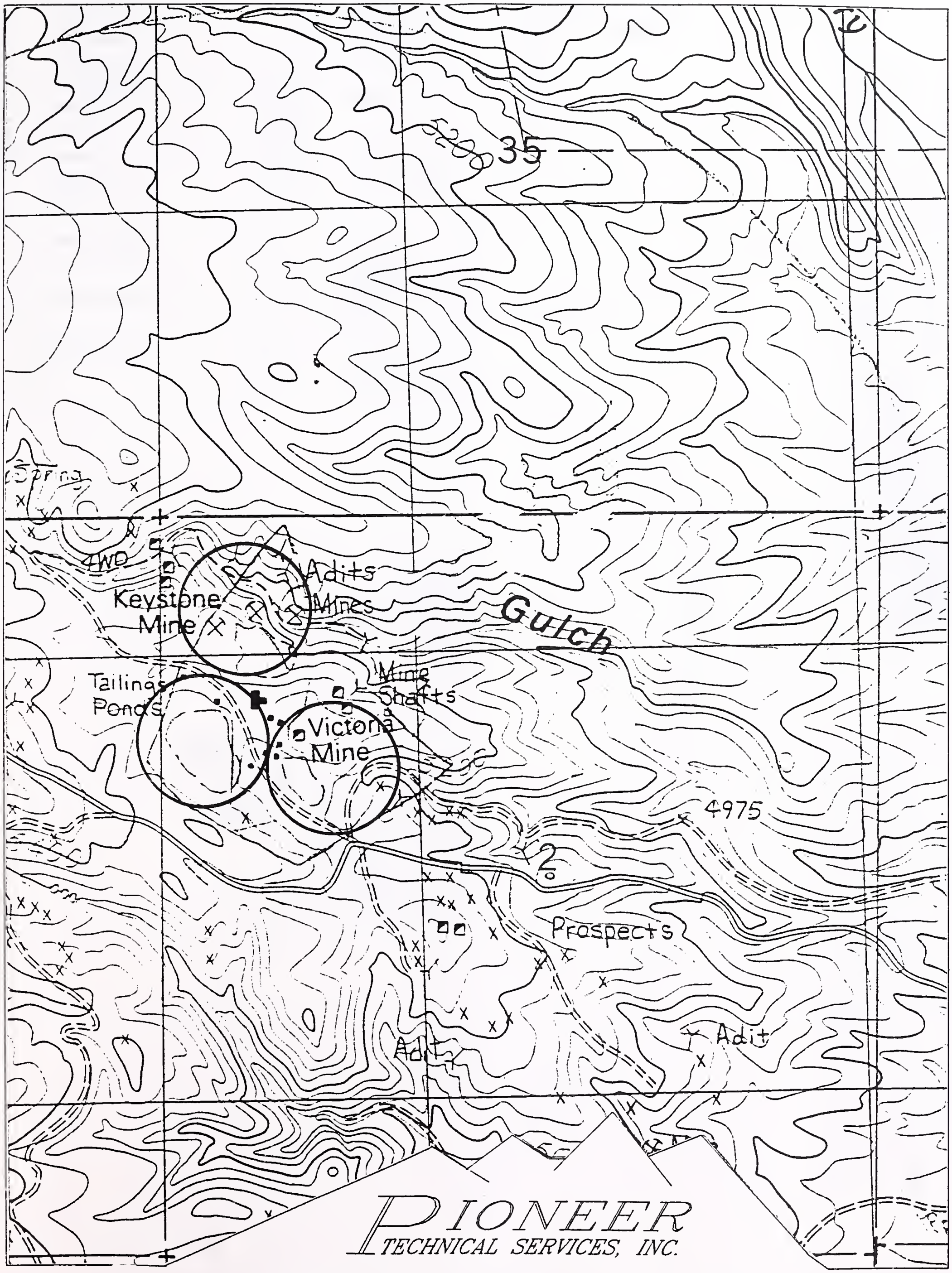
Origin of Ore Milled - Custom Mill ___ Dedicated Mill ___ ; Number and names of mines that supplied mill feed: Unknown

Process? Hg-amalgam, CN^- leach (vat, heap), floatation, smelting?
Possible CN- leach during later operations

Montana Bureau of Mines and Geology
Water Well Log Data

11/01/1993

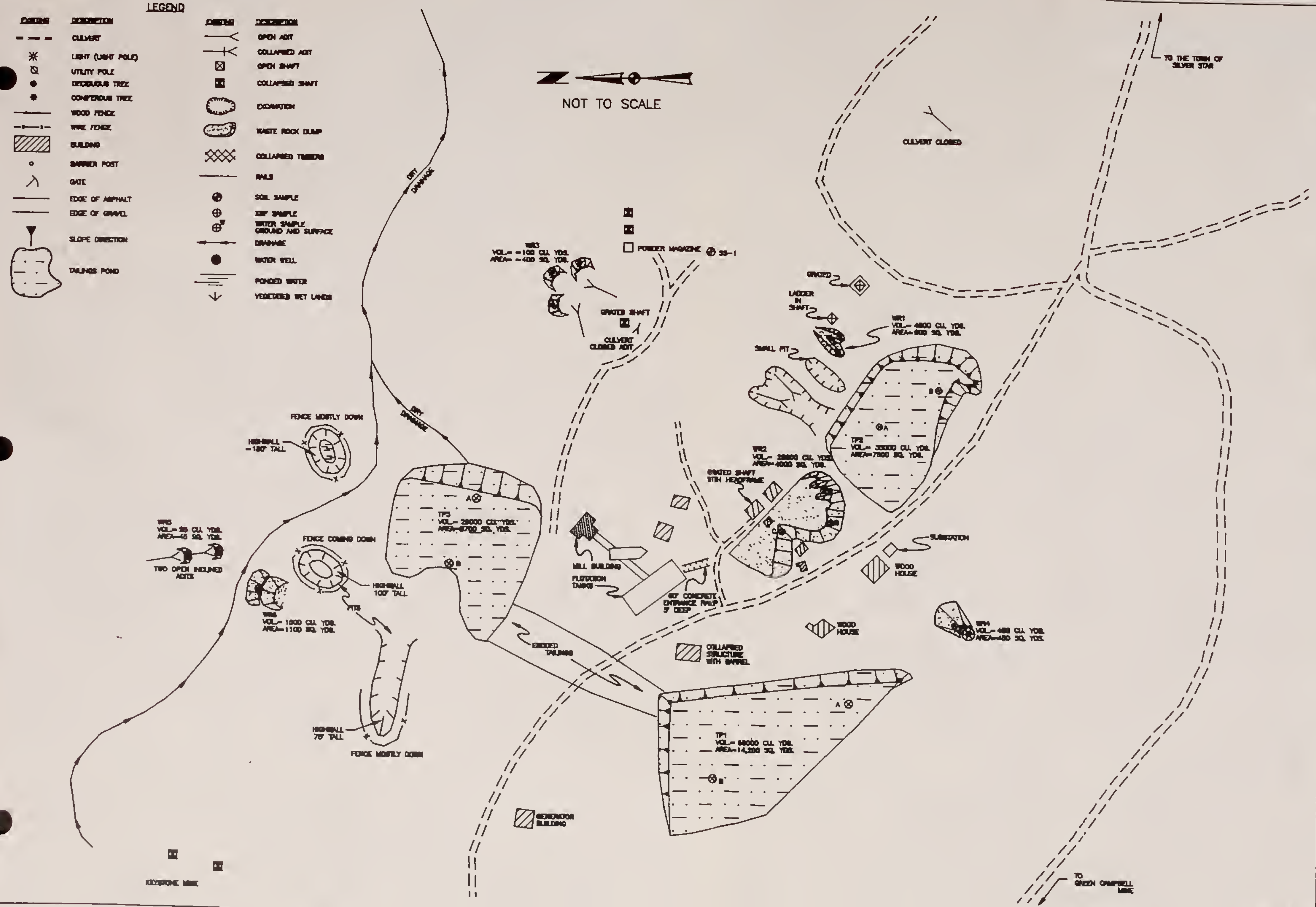
Well No.	Location	Depth	Yield	Static Water Level
M:107346	02S 06W 01 AA	75.0	5.0	65.00
M:107347	02S 06W 01 AD	100.0	10.0	15.00
M:107348	02S 06W 01 ADD	52.0	15.0	25.00
M:107349	02S 06W 01 BAC	80.0	5.0	20.00
M:107353	02S 06W 01 D	53.0	18.0	31.00
M:107352	02S 06W 01 D	58.0	20.0	42.00
M:107350	02S 06W 01 D	55.0	15.0	25.00
M:107351	02S 06W 01 D	60.0	30.0	31.00
M:107354	02S 06W 01 DA	62.0	10.0	32.00
M:107357	02S 06W 01 DB	54.0	13.0	25.00
M:107356	02S 06W 01 DB	60.0	30.0	32.00
M:107355	02S 06W 01 DB	56.0	30.0	28.00
M:107358	02S 06W 01 DBBD	77.0	20.0	41.00
M:107359	02S 06W 01 DBDA	58.0	20.0	30.00
M:107360	02S 06W 01 DBDD	54.0	30.0	Flowing
M:107361	02S 06W 01 DCA	46.0	20.0	32.00
M:107362	02S 06W 01 DCAB	60.0	15.0	15.00
M:107364	02S 06W 01 DDB	100.0	30.0	0.00
M:107363	02S 06W 01 DDB	44.0	30.0	40.00
M:107365	02S 06W 01 DDBD	60.0	30.0	0.00
M:130116	02S 06W 12 AA	40.0	10.0	8.00
M:107370	02S 06W 12 AAA	65.0	0.0	5.00
M:123899	02S 06W 12 BA	87.0	12.0	31.00
M:107371	02S 06W 12 BB	42.0	21.0	20.00
107372	02S 06W 12 BCDD	60.0	30.0	45.00
M:107373	02S 06W 12 CC	23.0	30.0	8.00
M:8988	02S 06W 12 CCCB	148.0	0.0	48.00
M:107374	02S 06W 12 CCCB	148.0	8.0	48.00
M:107376	02S 06W 12 CCCC	115.0	8.0	0.00
M:107375	02S 06W 12 CCCC	37.0	20.0	35.00
M:8989	02S 06W 12 CCCC	115.0	0.0	30.00
M:107099	01S 06W 36 C	72.0	15.0	20.00



BROADWAY/VICTORIA, P.A. NO. 29-179

T02S, R06W, SECTION 02

SCALE: 1" = 1000'



MONTANA DEPT. OF STATE LANDS
HAZARDOUS MATERIAL INVENTORY

BROADWAY / VICTORIA PA# 29-179
SILVER STAR DISTRICT MADISON COUNTY

PIONEER TECHNICAL SERVICES, INC. BUTTE, MT.

DRAWN	JTP	DATE	1 NOV 93
DESIGNED	TPR	JOB NO.	93-17
APPROVED	WJB	F.B. NO.	

TD&H

THOMAS, DEAN & HOSKINS INC.
ENGINEERING CONSULTANTS
GREAT FALLS-BOZEMAN-KALISPELL MONTANA
SPOKANE WASHINGTON

SHEET NO.

29-179.DWG SHEETS

II. INFORMATION COLLECTED ON SITE

A. SOLID MATRIX WASTE CHARACTERIZATION

1. Waste Characteristics - Use table on following page.

Unique source identification (e.g. west waste rock dump #2) and abbreviation on sketch map and source list (e.g. WWRD2). Locate source on sketch map with any measured distances from at least two landmarks.

Source types: Waste rock dumps and piles (WR); tailings impoundments and piles (TAIL); vats, vessels, tanks that contain something (VAT); barrels - not empty (BAR); soils contaminated by spills or leaks (SP); suspected asbestos containing materials (ACM); garbage/refuse/junk dumps (DMP); other sources (OTH).

Source size: Estimated volumes (cu. yards or feet, # of barrels) for each source identified above.

Location/Description: List location and description for each source identified above.

Waste containment: Is the source contained with respect to groundwater, surface water, and airborne releases or the potential to release? Good, adequate, poor, or none. Are waste structures / vessels sound, are runon/runoff controls in place, are wastes covered or vegetated, pond liners intact?

2. TAILINGS IMPOUNDMENTS - If tailings impoundments are also present, complete the following questions.

Describe the tailings grain size distribution(approximate % sand, silt, & clay): TP-1 is very heterogeneous, some parts of impoundment are all clay with other parts fine sand; TP-2 is fine sand with clay underneath; and, TP-3 is mostly fine sand.

Determine tailings impoundment depth and describe stratification of the tailings if observable(based on texture and color): On TP-1, the bottom was not reached; berm is 30 feet high. The shallow end bottom of TP-2 is 14.5 feet and the berm is 20 feet high. The bottom was not reached on TP-3; berm is 30 feet high.

Are tailings wet or dry (Describe location of partially wetted tailings impoundments): Moist underneath to saturated and dry on top.

Describe condition of the tailings impoundment(Note condition of dams or structures, location of breaches): All berms are breached.

Comments on potential for mitigation: Reprocess for metal content.

SOURCE INVENTORY FORM

SAMPLERS: M. Babits, S. Babits, Flammang*

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-1A-A	TAIL	68,000	Near berm in southeast corner; 0-6', brown fine sand	None	5.8 (D)	0.02	29-179-TP-1	09/17/93 1550	T-Metals, ABA
TP-1A-B	TAIL		6-12', tan/orange silt and fine sand/clay	None	5.2 (D)	0.02			
TP-1A-C	TAIL		12-16', tan/orange silt and fine sand/clay	None	5.2 (D)	0.03			
TP-1B-A	TAIL		Near berm in northeast corner; 0-6', brown moist clay with red clay lenses	None	4.8 (D)	0.02			
TP-1B-B	TAIL		6-13.5', brown moist clay with red clay lenses	None	5.4 (D)	0.04			
TP-2A-A	TAIL	35,000	Middle of pond; 0-4.5', fine red dry sand with clay lenses	None	4.4 (D)	0.02	29-179-TP-3	09/17/93 1550	T-Metals, ABA
TP-2A-B	TAIL		4.5-7.5', gray saturated clay	None	5.2 (D)	0.04	29-179-TP-5	09/17/93 1800	T-Metals, ABA, CN-
TP-2A-C	TAIL		7.5-14', dark red moist sand	None	5.4 (D)	0.02			
TP-2A-D	TAIL		14-14.5', underlying soil	None	5.8 (D)	0.02	N/A	N/A	XRF Analysis
TP-2B-A	TAIL		Near berm on southeast corner; 0-3', red fine sand with clay lenses	None	< 3.5 (D)	0.02			
TP-2B-B	TAIL		3-4', gray saturated clay	None	< 3.5 (D)	0.02			
TP-2B-C	TAIL		4-13', gray fine silty sand	None	< 3.5 (D)	0.02			
TP-2B-D	TAIL		13-13.5', gray fine dry sand	None	< 3.5 (D)	0.02			

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-179-TP-1 is composite of TP-1A-A through -1A-C, and TP-1B-A and -1B-B. 29-179-TP-3 is composite of TP-2A-A and TP-2B-A. 29-179-TP-5 is composite of TP-2A-B and -2A-C, and TP-2B-B through -2B-D.

*Continued on next page

SOURCE INVENTORY FORM (Cont'd)

SAMPLERS: M. Babits, S. Babits, Flammang

SOURCE I.D. NO.	SOURCE TYPE	SOURCE VOLUME (yd^3)	LOCATION/DESCRIPTION	CONTAIN-MENT	pH SU (D/S)*	RADIO-ACTIVITY (mR/HR)	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
TP-3A-A	TAIL	29,000	Near berm in northwest corner; 0-4', orange sand/silt/clay	None	< 3.5 (D)	0.02	29-179-TP-2	09/17/93 1545	T-Metals, ABA
TP-3A-B	TAIL		4-9', gray silt, fine sand, and clay	None	< 3.5 (D)	0.03			
TP-3A-C	TAIL		9-13', light brown silt and sand	None	< 3.5 (D)	0.02			
TP-3A-D	TAIL		13-16', tan/gray sand	None	< 3.5 (D)	0.03			
TP-3B-A	TAIL		South end of pond; 0-2', fine/medium red sand	None	< 3.5 (D)	0.02			
WR-1	WR	1,500	South end of east lobe near top	None	6.7 (D)	0.045	29-179-WR-1	09/17/93 1750	T-Metals, ABA
WR-2A	WR	28,000	South end of pile on second knob	None	5.95 (D)	0.025			
WR-2B	WR		West of Building No. 1 (lift house)	None	5.3 (D)	0.025			
WR-2C	WR		West of Building No. 2 in red stained area	None	< 3.5 (D)	0.03			
WR-3	WR	100	Composite of three small dumps by shaft and culvert	None	6.8 (D)	0.03	N/A	N/A	XRF Analysis
WR-4	WR	450	South of TP-1, north of prospect pit; center	None	6.05 (D)	0.025	N/A	N/A	XRF Analysis
WR-5	WR	25	Composite of two small dumps assoc. with Adit A-2 and Adit A-3	None	7.37 (S)	0.06	N/A	N/A	XRF Analysis
WR-6	WR	1,500	Northwest of two smaller pits in Tom Bench Gulch	None	7.48 (S)	0.04	29-179-WR-2	09/17/93 1500	T-Metals, ABA
SS-1	BKGRND	N/A	Background soil on ridge east of fenced shaft	None	6.75 (D)	0.03	29-179-SS-1	09/17/93 1115	T-Metals
OTH	TAIL	N/A	Grab from floatation tanks in mill building	Broken Tanks	N/A	N/A	29-179-TP-4	09/17/93 1410	T-Metals, ABA, CN-

*D-Direct reading(Kelway Meter); S-Saturated Paste(Orion Meter)

Comments or deviations from SOPs: 29-179-TP-2 is composite of TP-3A through -3D, and TP-3B-A. 29-179-WR-1 is composite of WR-1 and WR-2A through -2C. 29-179-WR-1 is composite of WR-1, and WR-2A through -2C. 29-179-WR-2 is grab of WR-6.

B. GROUNDWATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map.

Flowing adits: Yes___, No X , Number:____ Identification:____________

Filled shafts: Yes___, No X , Number:____ Identification:____________

Seeps/Springs: Yes___, No X , Number:____ Identification:____________

Groundwater wells within 4 miles?: Yes X , No___;
Number of well logs: 90

Distance to nearest well used for drinking? 1 mile

Sample types: Flowing adits (AD); filled shafts (SH); Residential wells (RW); Monitoring wells (MW); Seeps/Springs (SP).

Field Measurements: Flow (measured or estimated), pH (meter), Eh (meter), SC (meter), temperature (meter), Alkalinity (test kit)?

Potential for groundwater contamination (explain)?
Definite____, Probable____, Possible X , Unlikely____.
Shafts are reported to be into water; elevated metal values in dumps indicate water could be in contact with rocks. Tailings and waste rock are uncontained and contain elevated metal values.

Other observations/notes: N/A

GROUNDWATER INVENTORY FORM

SAMPLERS: ____________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SOURCE	FLOW* cfs/gpm	pH SU	SC μS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Depth ft	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.												

FLOW: Estimated (E) or Measured (M) from adit, shaft, seep or spring?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ____________________

C. SURFACE WATER CHARACTERISTICS

Use table on following page. Identify all locations on sketch map or topographic map. Indicate drainage patterns (run-on/runoff) and directions on sketch maps.

Flowing streams: Yes____, No X , Name(s):

Dry streambeds: Yes X , No___, Name(s): Tom Benton Gulch

Other surface water: Yes____, No X , Name(s)/Description:

Waste materials within any floodplain: Yes X , No___ Source ID(s): WR-6 and a small unsampled dump are in Tom Benton Gulch.

Approximate Flood frequency?___1 yr,___10 yr,___100 yr

Estimated seasonal flow of stream(s) (cfs)? N/A
High Flow:__________, Average Flow:__________

Distance between waste source(s) and nearest surface water body (ft)? 1.5 miles

Surface water draining onto or through waste sources: Yes X , No____,
Describe: Erosion channels in TP-1, TP-2, and TP-3. WR-6 and small dump in Tom Benton Gulch.

Surface water use within 15 miles downstream? (Drinking water supply, irrigation, residential use? Sensitive environments within 15 miles downstream? Park, Wilderness, Fishery, Wetland, T&E habitat?)
Fishing, wetland, irrigation, agriculture

Observed erosional/sedimentation/stream turbidity problems? Yes X ,
No_____, Distance downstream (ft)? 200+ Describe/explain (Note streambank stability and condition of streambank vegetation and any manmade structures or channel changes present):
Presence of tailings from TP-3 in Tom Benton Gulch.

SURFACE WATER INVENTORY FORM

SAMPLERS: ________________

SAMPLE I.D. NO.	SAMPLE TYPE	DESCRIPTION OF SAMPLE LOCATION	pH SU	SC µS/cm @ 25°C	Eh mV	Temp °C	ALK. mg/L as $CaCO_3$	Flow* cfs/gpm	LAB. SAMPLE NO.	DATE/ TIME	ANALYSES
No samples were taken.											

FLOW: Estimated (E) or Measured (M)?

Comments or Deviations from the SOPs (Pioneer SAP, 1993): ________________

D. ACID MINE DRAINAGE (AMD) POTENTIAL

Evaluate each source in table on next page.

AMD Characteristics:

Presence and abundance of sulfides?	(SO_3)
Presence of evaporative salt deposits?	(ESD)
Discolored or turbid seepage?	(SPG)
Presence of long filamentous algae in drainages, mosses in moist areas?	
Presence of ferric hydroxide precipitates?	(FEOX)
Presence of burned or stressed vegetation?	(VEG)
pH ≤ 5.0	(pH)

General Potential for AMD Mitigation:

Area available for treatment (acres)? 50 acres (No AMD)

Wetlands present: Yes___, No_X_, Describe:

Carbonate rocks/soils: Yes_X_, No___, Describe: Limestone present in some dumps; carbonaceous soils are also present.

E. AIR PATHWAY CHARACTERISTICS

Population within 4-mile radius: 1-10___; 10-30___; 30-100___; 100-300_X_; 300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___; Comments

Nearest residence(ft or miles)? 1 mile

For each source (table next page):

Available fine materials? Surface area?

Uncovered and unvegetated? Wet or dry?

Overall dust propagation potential:
observed high moderate low none

ACID DRAINAGE/AIR PATHWAY INVENTORY FORM

SAMPLERS: M. Babits, S. Babits, Flammang

SOURCE I.D. NO.	**ACID MINE DRAINAGE CHARACTERISTICS** (LIST)	**MOISTURE CONTENT** (WET/DRY/PARTIAL)	**SURFACE AREA** (SQUARE FEET)	**UNCOVERED/UNVEGETATED AREA** (SQUARE FEET)	**AVAILABLE FINES** (YES/NO)	**DUST PROPAGATION POTENTIAL** (OBSERVED/HIGH/MODERATE/LOW/NONE)
TP-1	None	Dry	127,800	127,800	Yes	Moderate/High
TP-2	pH	Dry	67,500	67,500	Yes	High/Observed
TP-3	pH	Dry	78,300	78,300	Yes	Moderate/High
WR-1	None	Dry	8,100	7,290	Yes	Low
WR-2	SO3; pH	Dry	36,000	30,600	Yes	Low/Moderate when disturbed
WR-3	None	Dry	3,600	3,060	Yes	Low except when disturbed
WR-4	None	Dry	4,050	3,847	Yes	Low
WR-5	None	Dry	405	384	Yes	Low except when disturbed
WR-6	SO3	Dry	9,900	4,950	Yes	Low except when disturbed

Notes and Clarifications:

F. DIRECT CONTACT CHARACTERISTICS

Residents or workers within 200 feet of sources: Yes____, No_X_,
Describe:____________________

Population within 1 mile: 1-10___; 10-30___; 30-100___; 100-300___;
300-1,000___; 1,000-3,000___; 3,000-10,000___; 10,000 or greater___;
Comments_None_

Evidence of recreational use on site: Yes_X_, No___, Describe:_Pop and beer cans; 4-wheel drive vehicle tracks on tailings piles_

Accessibility - Fences, warning signs, closed roads?_Two shafts are grated and another shaft is grated with three-strand barbwire and signs. Four pits are fenced, but fence is coming down and is completely gone in one section. Two adits have culvert closures._

Sensitive environments on-site or adjacent to site:
State or National Parks - Yes___, No_X_, Comment________
Wilderness Area - Yes___, No_X_, Comment________
T&E Species Habitat - Yes_X_, No___, Comment_Peregrine; Bald Eagle_
Bat Habitat - Yes___, No_X_, Comment________

Primary Drainage___; Secondary Drainage_X_; No Information___:
Riparian Habitat Quality - High___, Medium_X_, Low___
Wetlands Frontage - High_X_, Medium___, Low___
Fisheries Habitat and Species Classification - _4_
Sport Fishery Classification - _2_

G. SAFETY CHARACTERISTICS

Verify completeness of AMRB Inventory

Hazardous openings: Yes_X_, No___, Number_5_, types and locations:_One shaft directly west of WR-1; one adit east of WR-1; two adits associated with WR-5; fence above P-2 is completely down with a very hazardous drop of 100 feet._

Hazardous structures: Yes_X_, No___, Number_12_, types and locations:_Lift house with metal roof; headframe; wood core and sample shed; two metal buildings; mill building (five connected structures) with equipment still present; partially collapsed house with stone foundation, a house by 8, and a wood house on the southwest side of the road; greenhouse on the south side of the road; buried powder magazine by Shaft #1; and, a structure down in the gulch by P-3._

Unstable highwalls, pits, trenches, slopes: Yes_X_, No___, Number_5_,
types and locations:_Top of highwalls in soil_

Unstable waste piles, impoundments, undercut banks: Yes_X_, No____,
Number_1_, types and locations:_Oversteepened side of WR-2_

Fire and/or Explosion hazards: Yes_X_, No___, Explain:_Wood buildings_

Bibliography

Fritzshe, Hans, Geology and Ore Deposits of the Silver Star Mining District, Madison County, Montana, Thesis Written for the Montana School of Mines, Butte, Montana, 1935.

MBMG, Well Log Database, September 8, 1993.

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LABORATORY ANALYTICAL DATA

BROADWAY/VICTORIA
PA NO. 29-179

MDSL AMRB/PIONEER 4/9/93

Broadway/Victoria PA# 29−179
AMRB HAZARDOUS MATERIALS INVENTORY
INVESTIGATOR: PIONEER − BABITS
INVESTIGATION DATE: 09/17/93

SOLID MATRIX ANALYSES

Metals in soils
Results per dry weight basis

FIELD ID	As (mg/Kg)	Ba (mg/Kg)	Cd (mg/Kg)	Co (mg/Kg)	Cr (mg/Kg)	Cu (mg/Kg)	Fe (mg/Kg)	Hg (mg/Kg)	Mn (mg/Kg)	Ni (mg/Kg)	Pb (mg/Kg)	Sb (mg/Kg)	Zn (mg/Kg)	CYANIDE (mg/Kg)
29−179−TP−1	74.1 J	234 J	17 J	7.16	10.9 J	547	38100 JX	0.147 J	9620	21.5	1740	11.9 J	5230 J	NR
29−179−TP−2	61.4 J	23.3 J	11 J	10.4	9.34 J	4010	89000 JX	0.306 J	2290	12.7	622	7 UJ	1660 J	NR
29−179−TP−3	223 J	0.237 U	22 J	3.54	5.99 J	300	60200 JX	0.264 J	8040	16.1	1380	7.15 J	3550 J	NR
29−179−TP−4	68.2 J	98.5	78	21.1	28.7	2540	50400	2.39 J	3240	34.9	1870	51.7 J	32300	1.9
29−179−TP−5	387 J	28.1 J	37 J	6.93	12 J	599	60800 JX	0.58 J	4830	25.1	3760	18 J	7230 J	6.15
29−179−WR−1	218 J	62.1	48	9.45	16.9	716	29900	0.694 J	2260	17.2	4020	16.6 J	7450	NR
29−179−WR−2	8.82 J	47.4 J	3 J	26.5	4.88 J	3290	42500 JX	1.56 J	4690	11	18.5	5.97 UJ	330 J	NR
BACKGROUND	48.3 J	93.9	5	6.35	17.7	109	19100	0.086 J	1040	15.1	227	6.39 J	676	NR

U − Not Detected; J − Estimated Quantity; X − Outlier for Accuracy or Precision; NR − Not Requested

Acid/Base Accounting

FIELD ID	TOTAL SULFUR %	TOTAL SULFUR ACID BASE t/1000t	NEUTRAL. POTENT. t/1000t	SULFUR ACID BASE POTENT. t/1000t	SULFATE SULFUR %	PYRITIC SULFUR %	ORGANIC SULFUR %	PYRITIC SULFUR ACID BASE t/1000t	SULFUR ACID BASE POTENT. t/1000t
29−179−TP−1	0.06	1.87	2.17	215	0.04	<0.01	0.05	0	217
29−179−TP−2	6.08	190	23.5	−166	<0.01	3.91	2.28	122	−98.6
29−179−TP−3	7.16	224	237	13	<0.01	5.71	2.2	178	58.3
29−179−TP−3	7.14	223	237	13.5	<0.01	5.68	2.21	177	59.2
29−179−TP−4	2.01	62.8	111	47.8	0.84	0.43	0.74	13.4	97.2
29−179−TP−5	5.19	162	190	27.5	<0.01	6.42	1.73	201	−10.8
29−179−WR−1	0.99	30.9	189	158	0.74	<0.01	0.32	0	189
29−179−WR−2	0.06	1.87	135	133	0.05	<0.01	0.01	0	135

LEGEND

TP1 − Composite of subsamples TP1A−A, 1A−B, 1A−C, 1B−A, and 1B−B.
TP2 − Composite of subsamples TP3A−A through 3A−D, and 3B−A
TP3 − Composite of subsamples TP2A−A and 2B−A.
TP4 − Grab from flotation tanks in mill building.
TP5 − Composite of subsamples TP2A−B, 2A−C, 2B−B, 2B−C, and 2B−D.
WR1 − Composite of subsamples WR1, 2A, 2B, and 2C.
WR2 − Sample of the WR6 subsample.
BACKGROUND − From the Broadway/Victoria (29−179−SS−1).

XRF ANALYSIS RESULTS

BROADWAY/VICTORIA
PA NO. 29-179

MDSL AMRB/PIONEER 4/9/93

Mine Name: Broadway/Victoria PA# 29-179
XRF Field Analyses
Results in PPM
Page 1 of 2.

XRF SAMPLE ID	CrHI	K	Ca	Ti	CrLO	Mn	Fe	Co	Cu	Zn	As	Sr
29-179-SS-1			64909.5	2220.69		2060.08	40880		118.183 *	810.014		315.736
29-179-TP1A-A			109267	319.945 *		24266	109965		432.75	2486.48	66.6218 *	260.418
29-179-TP1A-B			100103	1071.29		16857.9	104816		769.161	4875.14	119.622 *	326.866
29-179-TP1A-C			80380.2	878.131		3002.86	97503.3		1070.61	8332.31		295.08
29-179-TP1B-A			134927	588.367 *		19982.5	87390.6		546.763	4177.91		340.474
29-179-TP1B-B			79981.5	382.621 *		22492.1	105545		583.92	5218.38		354.186
29-179-TP2A-A			87440.1	266.835 *		7172.14	40110.2		166.786 *	1889.1	85.6394 *	70.0218
29-179-TP2A-B			70423.8	910.866		6183.9	56148.5		523.377	4070.11	112.165 *	153.649
29-179-TP2A-C			18358.4			1431.01 *	342808	1502.28 *	2168.73	7762.88	339.436 *	132.284
29-179-TP2A-D			84691	705.503 *		776.919 *	158261	609.233 *	682.531	2683.09	129.757 *	353.676
29-179-TP2B-A			92997.3	292.038 *		8305.04	47249.1		140.309 *	2551.97	136.498 *	59.4199
29-179-TP2B-B			85767.8	1429.19		5871.12	35058.3		318.115	2515.86		481.909
29-179-TP2B-C			81852.6	751.774		8117.34	55893.6		323.757	13263.8		37.3248
29-179-TP2B-D			48664.5	2596		2196.88	53255.7	585.037 *	260.059	6794.5	217.686 *	48.9885
29-179-TP3A-A			74515.6	448.965 *		3042.58	155462	852.6 *	1814.47	337.959	68.5464 *	59.3908
29-179-TP3A-B			59079.8	359.509 *		4735.45	169016		2551.43	917.1	83.2757 *	62.3381
29-179-TP3A-C			60198.6	899.626		2802.51	167705	841.172 *	4462.1	1427.48	96.5351 *	215.982
29-179-TP3A-D			79661.2	693.25		5264.86	93273.9		999.054	3358.14		117.269
29-179-TP3B-A			42765.1	197.035 *		1822.39	176900	985.755 *	1776.98	530.375		79.2133
29-179-TP-1-COMP			94107	474.667 *		15697.2	106803		922.172	5316.25		304.143
29-179-TP-2-COMP			51814.6	545.485		2919.59	143916		2288.13	1125.71		135.785
29-179-TP-3-COMP			88580.2	336.647 *		7907.28	44225.3		216.916	2163.29		76.0461
29-179-TP-5-COMP			63115.3	1508.17		4865.43	81493.1	755.408 *	650.504	5790.45		154.589
29-179-WR2-A			168978	1172.46		579.461 *	28202.2		511.701	3277.23		900.266
29-179-WR2-B			110135	2311.05		2568.97	43198.4		809.545	2057.49	38.7228 *	107.725
29-179-WR2-C			79183.7	257.346 *		4223.84	132334		804.188	274.882	92.888 *	101.647
29-179-WR-1			51686.5	1058.5		948.318 *	52380.5		514.353	15607.1		324.503
29-179-WR-1-COMP			118280	1310.29		2722.41	67028.5		739.161	5050.8		371.992
29-179-WR-3			72103.8	826.006		5352.63	112757		935.17	2057.94	74.0347 *	366.619
29-179-WR-4			144927	709.919			12598		38.8757 *	102.524 *	47.8472 *	332.516
29-179-WR-5			27365.1	1158.92		3375.87	48797.7		655.855	130.656 *	32.1194 *	248.609
29-179-WR-6			18124.8			10156.2	226464		7654.99	892.114	123.494 *	243.428

Mine Name: Broadway/Victoria PA# 29-179
XRF Field Analyses
Results in PPM
Page 2 of 2.

XRF SAMPLE ID	Zr	Hg	Mo	Pb	Rb	Cd	Sb	Ba	Ag	U	Th
29-179-SS-1	167.525			190.286	52.3875			445.229	114.389 *		
29-179-TP1A-A	30.1149			317.322	23.9187 *			217.082			
29-179-TP1A-B	72.6431			188.314	38.0789 *			317.243	190.448 *		8.73471 *
29-179-TP1A-C	112.475		14.8182 *	3349.66	52.3152 *	241.866 *		279.722	248.991 *		14.2811 *
29-179-TP1B-A	50.5865			1196.29	34.8159 *	292.55 *		301.323	217.856 *		
29-179-TP1B-B	52.6867			1060.63	25.3232 *			307.967	151.243 *		
29-179-TP2A-A	16.7701		5.51438 *	527.313	15.4148 *						
29-179-TP2A-B	31.9628			1492.57	61.8435			61.5233 *	173.789 *		
29-179-TP2A-C	59.8817			1544.86	45.5808 *	357.986 *		164.884	354.951 *		10.2625 *
29-179-TP2A-D	113.513			506.524	38.363 *			262.09	176.762 *		
29-179-TP2B-A	17.5736			563.975	13.1563 *				103.082 *		
29-179-TP2B-B	51.2859			2065.44	74.1232			34.3532 *	177.482 *		10.3161 *
29-179-TP2B-C	31.2148			3347.19	24.346 *	269.886 *			139.801 *		
29-179-TP2B-D	40.1905		5.69198 *	1264.51	80.4843		77.5593 *	87.6268	146.304 *		
29-179-TP3A-A	22.0232		7.28802 *		13.0073 *	337.358 *		27.594 *	256.457 *		5.45201 *
29-179-TP3A-B	24.6063		5.15333 *		26.01 *	411.487 *			249.009 *		
29-179-TP3A-C	56.2348		7.33272 *		39.427 *			106.611	153.313 *		11.4339 *
29-179-TP3A-D	40.2554			1418.18	29.0337 *			94.5702			8.5704 *
29-179-TP3B-A	24.6036		6.93654 *	726.423	24.2585 *			50.8736 *	212.501 *		
29-179-TP-1-COMP	59.4208		6.35704 *	1604.17	29.4254 *			303.067	177.912 *		
29-179-TP-2-COMP	47.3798			264.471	19.3375 *			44.5759 *	205.67 *		6.06875 *
29-179-TP-3-COMP	14.7222			743.573	15.6882 *				117.976 *		
29-179-TP-5-COMP	41.208			2704.21	66.2467	289.733 *		55.5241 *	292.968 *		
29-179-WR2-A	59.3577			223.076	43.1078			160.443	135.248 *		6.79068 *
29-179-WR2-B	132.603			103.691	22.3888 *			410.329			6.21564 *
29-179-WR2-C	35.4756				12.2657 *			42.6159 *	143.052 *		
29-179-WR-1	138.41		12.3082 *	4693.53	105.844			260.569	198.403 *		20.8967 *
29-179-WR-1-COMP	103.38		5.85851 *	820.949	46.203			209.616	200.542 *		7.25097 *
29-179-WR-3	113.492			66.4305 *	28.6302 *			136.434	291.206 *		
29-179-WR-4	47.5942				57.0066			65.2189	93.0148 *		
29-179-WR-5	195.368		5.14764 *		200.883			980.086			13.9517 *
29-179-WR-6			14.3976 *		78.1575			47.5484 *	181.302 *		46.0191

* - Estimated Quantity
$ - Unvalidated Data

ABANDONED AND INACTIVE MINES SCORING SYSTEM (AIMSS) SCORESHEET

BROADWAY/VICTORIA
PA NO. 29-179

MDSL AMRB/PIONEER 4/9/93

AIMSS SCORESHEET

SITE NAME: BROADWAY/VICTORIA
PA NUMBER: 29-179

GROUNDWATER PATHWAY

LINE NO.				
1		OBSERVED RELEASE		0
2		EXCEEDENCES		0
3A	GW - LIKELIHOOD OF RELEASE	CONTAINMENT		20
3B		GW DEPTH		2
3C		POTENTIAL TO RELEASE	LINES 3A x 3B	40
4		LIKELIHOOD SCORE	LINES 1 + 2 + 3C	40
5	GW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	224.778
6		WELLS - 1 MI. x 2.5		80.0
7	GW - TARGETS	WELLS - 1 TO 4 MI		58
8		NEAREST WELL		0
9		TARGETS SCORE	LINES 6 + 7 + 8	138.0
10		**GROUNDWATER SCORE**	LINES 4 x 5 x 9	1240775

SURFACE WATER PATHWAY

LINE NO.				
11		OBSERVED RELEASE		0
12	SW - LIKELIHOOD OF RELEASE	EXCEEDENCES		0
13A		CONTAINMENT		20
13B		DISTANCE TO SW		2
13C		POTENTIAL TO RELEASE	LINES 13A x 13B	40
14		LIKELIHOOD SCORE	LINES 11 + 12 + 13C	40
15	SW - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	249.738
16		DRINKING WATER POP'N		0
17		IMPACTED DRAINAGE		0
18		WETLANDS		10
19	SW - TARGETS	FISHERY		1
20		RECREATION		5
21		IRRIGATION/STOCK		2
22		T & E SPECIES HABITAT		5
23		TARGETS SCORE	SUM LINES 16 THRU 22	23
24		**SURFACE WATER SCORE**	LINES 14 x 15 x 23	229759

AIR PATHWAY

LINE NO.				
25		OBSERVED RELEASE		200
26A	AIR - LIKELIHOOD OF RELEASE	CONTAINMENT		20
26B		DISTANCE TO POPULATION		5
26C		POTENTIAL TO RELEASE	LINES 26A x 26B	100
27		LIKELIHOOD SCORE	LINES 25 + 26C	300
28	AIR - WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	2.400
29		POPULATION - 4 MILES		100
30		NEAREST RESIDENCE		0
31	AIR - TARGETS	WETLANDS		10
32		PARKS / WILDERNESS		0
33		T & E SPECIES HABITAT		5
34		TARGETS SCORE	SUM LINES 29 THRU 33	115
35		**AIR PATHWAY SCORE**	LINES 27 x 28 x 34	82800

DIRECT CONTACT PATHWAY

LINE NO.				
36		OBSERVED EXPOSURE		50
37A	LIKELIHOOD OF EXPOSURE	ACCESSIBILITY		10
37B		DISTANCE TO POPULATION		5
37C		POTENTIAL EXPOSURE	LINES 37A x 37B	50
38		LIKELIHOOD SCORE	LINES 36 + 37C	100
39	D. C. WASTE CHAR.	CALCULATED SCORE	(SEE WORKSHEET)	0.000
40	DIRECT CONTACT TARGETS	POPULATION - 1 MILE		0
41		NEAREST RESIDENCE		0
42		RECREATIONAL USE		5
43		TARGETS SCORE	SUM LINES 40 THRU 42	5
44		**DIRECT CONTACT SCORE**	LINES 38 x 39 x 43	0

45 **TOTAL SITE HUMAN & ENVIRONMENTAL HAZARD SCORE**
(LINES 10 + 24 + 35 + 44) / 100,000 **15.53**

SITE NAME: BROADWAY/VICTORIA
PA NUMBER: 29-179

LINE NO.		**SITE SAFETY**		
1	THREAT	ACCESSIBILITY		10
2	HAZARDS	OPEN SHAFTS	100 EA.	100
3		OPEN ADITS	50 EA.	200
4		UNSTAB. HIWALLS / PITS	75 EA.	375
5		HAZ. STRUCTURES	40 EA.	480
6		EXPLOSIVES		0
7		HAZ. MATERIALS		100
8		HAZARDS SCORE	SUM LINES 2 THRU 7	1255
9	TARGETS	POPULATION - 1 MILE		0
10		NEAREST RESIDENCE		0
11		RECREATIONAL USE		5
12		TARGETS SCORE	SUM LINES 9 THRU 11	5
13		**SITE SAFETY SCORE**	(LINES 1 x 8 x 12) / 1,000	**62.75**